JUN 8 1925

June, 1925

Vol. XXXII, No. 6
50 Cents $5 a Year

The American City

PERIODICAL ROOM
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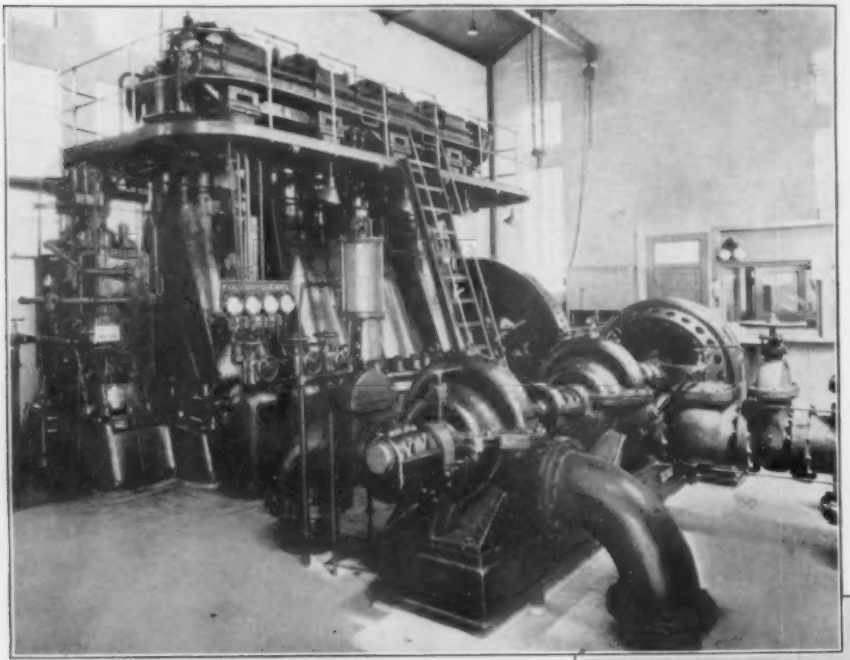
RAILROAD TRACKS IN RIVERSIDE PARK, NEW YORK, AND PROPOSED DEVELOPMENT OF ESPLANADE AND DRIVEWAY OVER THE RAILROAD

(See page 615 of this issue)

FULTON DIESEL



The Bureau of Water Works and Supply, City of Los Angeles, Cal.

Operates two FULTON-DIESEL pumping stations. A third station with three large Type "J" FULTON-DIESEL Engines, is now being built.

Installation in a residential district of the city of Los Angeles, California.

We have just published Bulletin No. 808, subject, "The Type-J FULTON-DIESEL. Type "J" units have been installed in the Los Angeles Stations. In addition to showing views of the plants using this type unit, Bulletin No. 808 lists all the engine sizes and ratings and in a convenient table gives the approximate dimensions of the engines.

We will be pleased to send you a copy.

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Vol. XXXII
No. 6

The American City Magazine

JUNE
1925

443 Fourth Ave.
NEW YORK

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$4 a Year

How Soon Shall We Build an American Garden City?

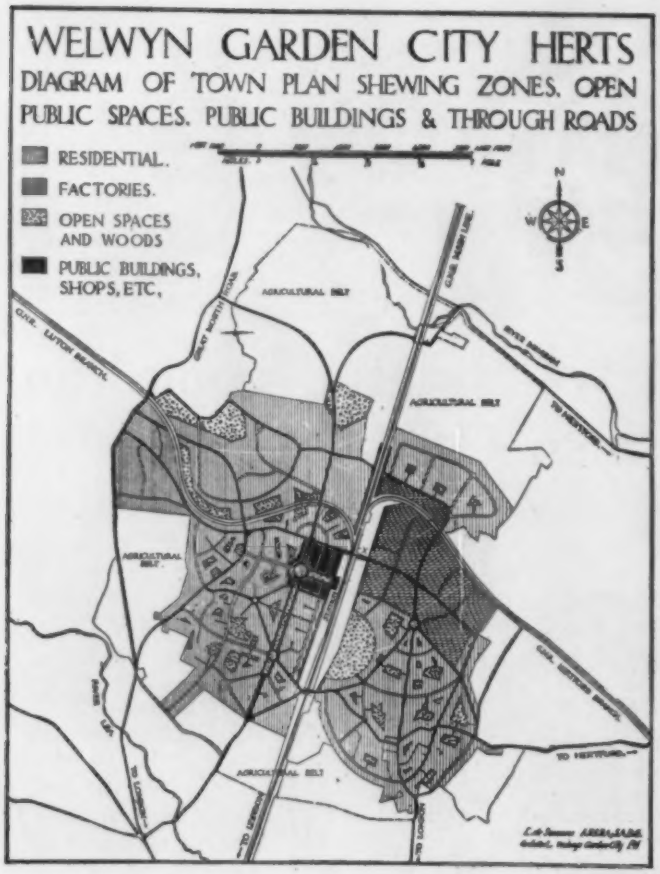
THERE is good reason to hope that a combination of forces recently set in motion will result before long in the financing and building of a real "garden city" in America. Among these forces may be mentioned: (1) the conference in New York, in April, of the International Federation for Town and Country Planning and Garden Cities; (2) the efforts in behalf of decentralization by the New York State Commission on Housing and Regional Planning, and by the Regional Plan of New York and Its Environs and other regional planning bodies throughout the United States; (3) the publication by *The Survey*, in its Graphic number for May, of a notable series of articles on regional planning and garden cities; (4) the activities of the City Housing Corporation, a limited dividend company, with headquarters in New York City, organized to build better homes and communities; and (5) plans for an association to promote the development of garden cities in America, initiated at a luncheon held in New York, on May 15, at the Town Hall Club.

By the leaders of all these movements, who are working in effective harmony, the term "garden city" is used substantially in accordance with the English definition as given at the bottom of page 614. England has two such cities—Letchworth and Welwyn; America has none. We have, to be sure, some excellent examples of well-planned small cities, such as Mariemont, Ohio; Longview, Wash.; Kingsport, Tenn.; and Garden City, L. I.; and of suburban or district developments, such as Yorkship Village in Camden, N. J.; Forest Hills Gardens, New York; and the Country Club District of Kansas City, Mo.; but none of these combines all of the features of the definition here quoted.

Why Not a Garden City Foundation?

Has not the time arrived for the establishment, by some public-spirited man or woman of large means, of a Garden City Foundation, the capital as well as the income of which would be used for the building of new communities? Some of the existing foundations can, no doubt, use portions of their income for this purpose; but why should not some American of vision put his surplus capital to work in this direction? Under proper restrictions the risk of loss in capital investment would be negligible; and the resulting benefits to the world would be far greater than if the foundation's capital funds were tied up in more traditionally conservative securities.

At the conference at the Town Hall Club, already mentioned, Ebenezer Howard, founder of the garden city movement and President of the International Federation of Town and Country Planning and Garden Cities, outlined the methods employed by the English associations at Letchworth and Welwyn and pointed out that similar organizations could be promoted more easily in America. He described how the money was raised to promote the new cities and showed that they had become commercially successful. Charles S. Bird, Jr., of Boston; Colonel Samuel P. Wetherill, Jr., of Philadelphia; Alexander M. Bing, President of the City Housing Corporation; Richard S. Childs, Vice-President of the National Municipal League; Lawson Purdy of the Charity Or-



ganization Society of New York; and Henry James of the Regional Plan of New York, were appointed by the meeting as a committee to formulate plans for a conference to be held in the fall to consider the forming of an American Garden City Association.

The objects of the new association will be identical as far as practicable with those of like organizations in England, although varied to some extent to suit American conditions. Among the possible variations suggested at the conference were: not making the restriction regarding size quite definite; wedges as an alternative to belts of permanent reservations of open land; and definitely and permanently zoning the use of the land as an alternative to public ownership, if the latter should prove impracticable.

As pointed out by Mr. Bing in the May *Survey Graphic*. "In the creation of new towns there must be organizing ability, substantial financial resources and business judgment; there should be, as well, a desire for esthetic and social achievement." After discussing some of the factors which must be united to build a successful garden city, Mr. Bing states his conclusions as follows:

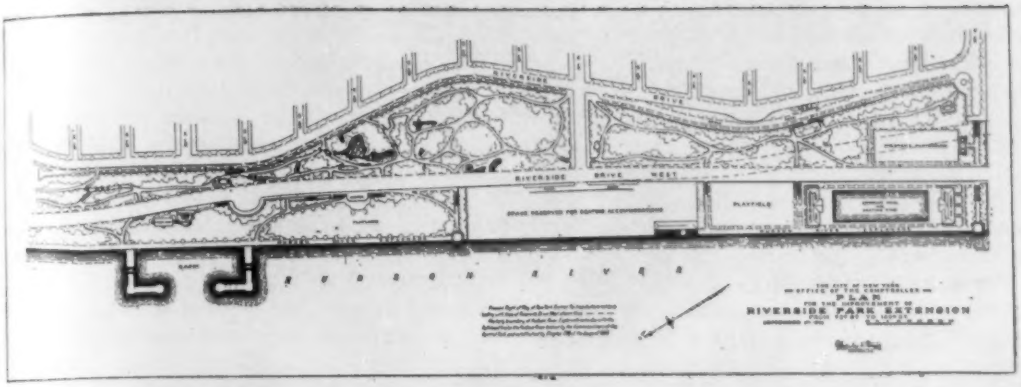
"There can be no doubt that a garden city experiment is desirable and practicable in America. Every large city ought to have a number of these new communities grouped conveniently around it, competing with each other to solve the social problems which underlie the business organization of community life. All this can be done on a business basis, that is to say, through the investment of funds. Their gift is unnecessary. But the investment should be on a limited dividend basis. The business success of English limited dividend companies can be more than duplicated over here. Profiting by their experience, and aided by the greater resources of America, such an enterprise ought to be a great financial success. If the tremendous energy and resources which would be mobilized for such an undertaking were to be harnessed to that abundant store of idealism which is latent in us, splendid results might be loked for.

"In the feverish rush of our huge, stone-encrusted cities we must seek some relief for the great masses of the population upon whom the evils of city life fall with the greatest force. Is it not time that we, in America, gave the garden city a trial?"

In order that an actual demonstration may soon be made of the garden city idea as adapted to American conditions, the members of the above-mentioned committee will welcome suggestions as to suitable sites and available capital for investment in the enterprise. One thing is certain: such a demonstration, if it shall combine idealism with practical business ability, will have a profound influence for good on the future of both urban and rural life in America.

A GARDEN CITY DEFINED

As defined by the founders of the garden city movement in England:
"A garden city is a town planned for industry and healthy living, of a size that makes possible a full measure of social life, but no larger, surrounded by a permanent rural belt, the whole of the land being in public ownership, or held in trust for the community."



Riverside Park Improvement Project

By Albert V. Sielke, Assoc. M. Am. Soc. C. E.

COMPTROLLER Charles L. Craig's plan for the improvement of Riverside Park, New York City, adopted by the Board of Estimate and Apportionment in 1924, is now under active consideration by the Board.

The plan transforms about three miles of unsightly water-front, now occupied by railroad tracks, coal-pockets, garbage dumps, and the like, into a beautiful park provided with playgrounds, a driveway, a promenade, and recreational centers. At the same time it preserves the utilitarian necessities, but subordinates them to artistic treatment.

Landscaping the park and reclaiming the lands now under water to the bulkhead line as established in 1868 will in some cases extend the park approximately 250 feet beyond the present shore line. The "Hudson River Es-

CROSS-SECTION THROUGH PROPOSED IMPROVEMENT OF RIVERSIDE PARK, NEW YORK CITY, LOOKING NORTH

(See also front cover of this issue)

planade," a 25-foot promenade with a sea-wall to be provided throughout the entire length of the park from 72nd Street to 129th Street, will enable the public to enjoy an unobstructed, beautiful and commanding view of the Hudson River and its opposite shore. The Esplanade is to be bordered with lawns and shade trees and will have rest houses provided at convenient intervals for the comfort of pedestrians.

The railroad tracks are to be roofed over by a new, wide driveway for automobile traffic, designed to relieve this greatly over-congested district, and to permit the diversion of some of the present Broadway and Fifth Avenue traffic. This driveway will provide an express outlet free from the interruptions and dangers of cross-traffic. To the north of 111th Street the driveway is to be divided into two parts, one connecting with the present Riverside Drive at 115th Street, and the other following the Esplanade to West 129th Street.

The plan provides for the creation of a park and places for real recreation along the river front. There will be an area totaling approximately 22 acres set aside for play-lawns, tennis courts, etc. A fresh-water pool is to be provided between 72nd and 75th Streets, to be used in the summer for swimming and for skating in the winter. Between 77th and 81st Streets it is proposed to eliminate the piers and convert the present garbage dump into a recreation pier with picturesque accommodations.

The Comptroller's plan for the beautification of Riverside Park is a simple and well-worked-out solution of the problem of converting this useless and unsightly strip of land into one of the most attractive recreational centers in the world.

Nation-wide Extent of City Planning

IN his paper on "Progress in Planning, 1925," presented at the International Town, City and Regional Planning Conference in New York last month, the following figures were given by George B. Ford:

"To-day city planning is active in 22 out of the 48 states. It is well launched in all but 6 of the remainder. During 1924, planning was in process in over 350 cities and towns—an increase of at least 100 over the year before. There are now over 300 city planning and zoning commissions and at least 7 state associations of planning boards. Nearly 100 towns of less than 10,000 people have commissions, and planning commissions are also currently at work in all but 3 of the 60 cities of over 100,000 inhabitants.

"Complete new towns, laid out according to the best planning practice, are being developed by Nolen at Mariemont, O., by Olmsted and Cheney at Palos Verdes, Calif., by Hare at Longview, Wash., by Bartholomew at Three Rivers, Texas, and by Phillips at Southfield Garden City, Mich.

"Zoning ordinances had been adopted by over 325 cities and towns up to the end of 1924, according to the Department of Commerce. Of these, 200 are "comprehensive" ordinances. . . .

"Subdivision platting is controlled in hundreds of cities and towns, and in at least 10 states for a distance of from 3 to 10 miles outside of the city limits. Many of these cities have adopted complete platting regulations, among which are Toledo, Duluth, Allentown, Norfolk, Cincinnati, Dayton, Memphis, Worcester, Rochester, Springfield, Mass., Los Angeles, Akron, and Haverhill. Most fortunately, Secretary Hoover, through his Division of Building and Housing and his Zoning Committee, is now endeavoring to harmonize and improve the platting and planning enabling acts in the various states, as they have already done with the zoning acts."

Appraisal Form for City Health Work

A CAREFULLY prepared appraisal form, or rating schedule, for appraising the health work of a city, is now available. This form has been developed jointly by the American Public Health Association's Committee on Municipal Health Department Practice, the American Child Health Association, and other agencies of the National Health Council, together with a special group of city health officers from New England, Michigan, and Ohio.

The American Public Health Association began an extensive study of the health work of the larger cities of the United States in 1920, and the American Child Health Association undertook a similar study of smaller cities in 1924, both organizations including the work of official and unofficial health agencies within their surveys. A large amount of most valuable information was collected and analyzed. With this material tabulated and studied, it was not difficult to set up standards of service based upon existing attainments in practice rather than upon arbitrary and theoretical considerations.

The standards and values of health work that this rating schedule contains provide a most useful tool for the health officer and sanitarian in judging of the completeness of his own work in comparison with the standards and work of other cities. The statement of standards and values is not presented, however, as a completed piece of work, but, like all first edition statements of standards, will be improved and revised under the test of experience. It has been published, therefore, for experimental use, and when experience has proved its valuable points and discovered its weak ones, it will be revised with the assistance of those who have used it.

Printed copies of this Appraisal Form for City Health Work and of a mimeographed Schedule for Health Survey of Cities can be secured from the Secretary of the American Public Health Association, 370 Seventh Ave., New York. Single copies are supplied free to members of the association and at a cost in quantity to organizations and health departments.

The Cost of Maintaining Macadam Streets

By B. C. Harvey
City Engineer, Rockford, Ill.

THERE are still many cities in the country in which a large proportion of the paving is water-bound macadam. The maintenance of streets of this type offers a big problem to street departments because of the ever-increasing motor traffic and the heavier transportation units. The city of Rockford has aimed to organize its maintenance and repair work in such a way as to minimize the necessary expense and to keep the streets in first-rate condition. A very careful cost system is maintained, so that as nearly as possible the exact cost for each piece of work is known.

Equipment

The city of Rockford owns and operates the following equipment for repairs and maintenance:

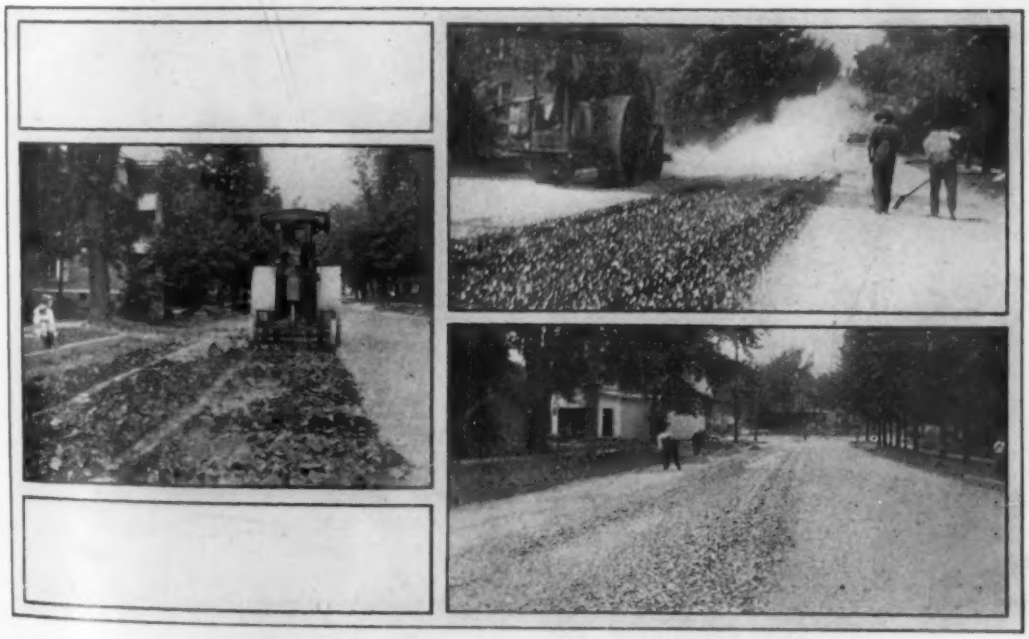
Two 12-ton Kelly-Springfield road rollers with steam scarifier attachment
One 5-ton Kelly-Springfield tandem roller.
One 3½-ton GMC truck
One 3½-ton Master truck
One 3½-ton Republic truck
One 3½-ton Diamond T truck
One 2-ton Republic truck
One 2-ton Master truck
One 5-ton Holt Caterpillar tractor
One 2-ton Holt Caterpillar tractor
One original design stone spreader
Two 1-ton Ford trucks
Two 2-ton Republic trucks with trailers equipped for street patrol work
One concrete mixer
Two portable air-compressors, together with a very modern quarry and stone-crushing plant equipped to manufacture from 20,000 to 50,000 cubic yards of stone yearly

Organization

The department is 100 per cent motorized, and skilled mechanics are engaged to operate the equipment. The average age of the men employed in the department is 40, which is low for a municipal organization. There is one superintendent of streets, one street foreman on resurfacing work, one street foreman on oiling (this man being a tractor-operator), one master mechanic who is responsible for the equipment, and one quarry superintendent.

The Quarry

The quarry is a new venture for the present administration. Operations were begun in April, 1924. The first year's operation has shown the cost fairly high, but this is not regarded seriously, as it takes time to adjust the equipment, make minor repairs and improvements, and build up the organization. It is expected to materially reduce costs dur-



RESURFACING OLD MACADAM STREETS IN ROCKFORD, ILL.

At left—Scarifying old macadam street prior to grading and reshaping. Upper right—Resurfacing the street, penetrating the 2¼-inch stones with bituminous material. Lower right—Spreading ¾-inch stones after penetration of the bituminous material

ing 1925.

The stone which is crushed at the quarry is a very hard, durable limestone. The crusher jaws are set to give four different grades of material: No. 0 material, which is dust; No. 1 material, ranging from ¼- to ½-inch stone; No. 2 stone, which ranges from ½ to 1¼ inches; and No. 4, which ranges from 1¼ to 2½ inches.

Resurfacing of Old Macadam Streets

When it comes time to resurface old macadam streets, they are scarified to a depth sufficient to either raise or lower the crown and quarter-points of the streets. The loosened base is then graded and thoroughly rolled, leaving a smooth and firm base. Stone ranging from 1¼ inches to 2½ inches is spread over the area to a depth of 3 inches. This stone is then rolled and compacted enough to allow a heavy truck to drive over it without causing deep ruts.

Bituminous material heated to a temperature ranging from 225 to 325 degrees Fahrenheit, using either heavy tar or heavy asphalt, is applied at the rate of not less than 1⅞ gallons nor more than 1.8 gallons per square yard. No. 2 stone or stone ranging in size from ½-inch to 1¼-inches is then spread uniformly over the whole surface, filling all voids.

This course is then thoroughly rolled, leaving a firm, uniform surface. The roadway is then swept free from all loose particles of stone not held by the bituminous material. Then, not less than ½-gallon nor more than ¾-gallon per square yard of the same kind of bituminous material is applied, heated to the above described temperature. No. 1 stone or stone ranging from ¼-inch to ½-inch in size is then uniformly spread over the surface.

The roadway is then thoroughly rolled again. The same kind of bituminous material heated to the same temperature as before is applied at a rate of not less than ¼-gallon nor more than ½-gallon per square yard. Coarse sand or what is known as torpedo sand is uniformly spread over the surface. The surface is then rolled again until the bituminous material has a tendency to show through the sand. This method has been found very successful, and after a few months of travel the streets look very similar to sheet asphalt pavement.

Amount and Cost of Resurfacing

During 1924, 2.276 miles of street were resurfaced as described above at a cost shown in detail below:

Rolling and scarifying, 1,060 hours at $1.50 per hour	$1,590.00
Grading roadway after being scarified, 64 hours at $2 per hour	128.00
Labor for spreading stone and building up subgrade, 3,132½ hours	1,900.21
Stone—6,806¼ cubic yards of crushed stone delivered to job at $1.75 per cubic yard	11,911.29
Gravel—73½ yards pea gravel delivered to job at $2 per yard	147.00
Asphalt—106,147 gallons of 110 penetration asphalt applied at 11.5 cents per gallon	12,206.92
Road oil—5,000 gallons of 45 per cent asphalt applied at 10.7 cents per gallon	535.00
Total cost	$28,418.51

Number of square yards resurfaced was 40,995.
Cost per square yard was $0.693.
The average number of gallons of asphalt used per square yard was 2.71.

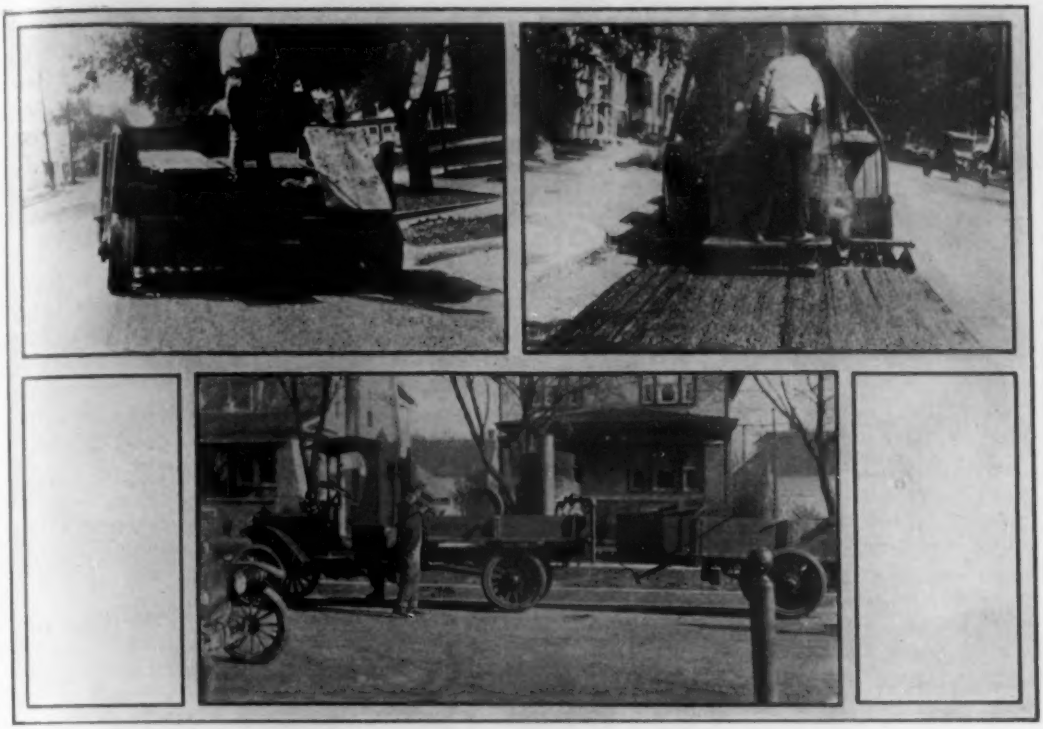
In the costs as recorded above, interest on the investment of equipment together with depreciation on the equipment is included. In the cost of the asphalt, car demurrage and cost of steam and clerical work are included. The bid price on 110 penetration asphalt was 10.98 cents applied, and the bid price on road oil, or 45 per cent asphalt, was 10.65 cents applied.

Surface Treatment of Macadam Streets

The surface-treating or oiling crew is composed of the superintendent of streets, who acts as supervisor, one foreman who is also a tractor operator, two laborers, and four truck operators. The equipment consists of one 5-ton Holt tractor, one stone spreader designed by the writer and made by the street department, and generally four trucks, though on some occasions only three trucks are necessary, depending on the length of haul. Two of the trucks are owned by the city of Rockford, and the other trucks are hired from the company from which material is purchased, based on cost per yard delivered.

When macadam streets are to be resurfaced, they are first thoroughly swept. The method of cleaning consists in sweeping the surface with two motor-driven Elgin pick-up sweepers. Two 1-ton Ford trucks are used for hauling the sweepings to the dump. The two truck operators and two laborers clean all places not accessible to the sweeper and shovel all rubbish into the trucks and haul it to the dump. The cost of cleaning is charged against the street-cleaning fund. The average cost per 1,000 square yards for cleaning all streets during 1924 was 41.48 cents.

The bituminous material is applied at a rate depending upon the condition of the surface of the roadway. The average rate of application during 1924 was approximately 1/7-gal-



SURFACE TREATMENT OF STREETS IN ROCKFORD, ILL.

Upper left—Spreading gravel prior to oiling. Upper right—Spreading bituminous material after road is covered with gravel. Lower—Street patrol outfit with Aviation trailer

lon per square yard. Finely graded gravel, known as pea gravel, is then uniformly spread over the surface of the roadway by the stone spreader, which operates uniformly to a width of 8 feet. The stone spreader is drawn by a 5-ton Holt tractor. The two laborers assist with loading the stone spreader and scatter extra gravel whenever necessary. The gravel is dumped directly into the stone spreader. We have surface-treated as much as 27,232 square yards of pavement in one 8-hour day.

Cost of Surface Treatment

During 1924 a total of 61.647 miles of macadam streets was surface treated, making a total of 1,113,826 square yards. The total cost for this work was $25,258.41, or a cost of $0.02267 per square yard. The cost of cleaning streets prior to surface treating is not included in this cost. The cost of surface treating is figured as follows:

OILING OF STREETS

Oiling with Road Oil	
Miles of streets oiled	0.534
Gallons of oil used—2,425 gallons @ 10.7c. per gallon	$259.48
Number of square yards	7,724
Cost per square yard	0.0335
Oiling with 4-B Asphalt	
Miles of streets oiled	0.253
Gallons of asphalt used—1,300 gallons @ 11.5c. per gallon	$149.50
Yards of sand—9 yards @ $1.00 per yard	9.00
2 yards of pea gravel @ $2.00 per yard	4.00
Labor spreading sand and gravel	18.60
Total cost	$181.10
Number of square yards	3,201
Cost per square yard	0.0565
Oiling with 3-B Asphalt	
Miles of streets oiled	10.95
Gallons of asphalt used—32,824 gallons @ 10c. per gallon	$3,282.40
232½ hours' labor	143.19
433½ yards of pea gravel @ $2.00 per yard	867.00
77½ yards of No. 1 stone @ $1.00 per yard	77.50
72 hours' labor spreading stone and dust and hauling same	144.00
63 yards of sand @ $1.00 per yard	63.00
41 hours' labor hauling and spreading sand	82.00
Total cost	$4,659.09
Number of square yards	185,870
Average cost per square yard	0.0250
Oiling with Tarvia B	
Miles of streets oiled	49.91
Labor	$469.89
Tractor	260.25
1891½ yards of pea gravel @ $2.00 per yard	3,783.00
130,545 gallons of Tarvia B @ 12c. per gallon	15,645.60
Total cost	$20,158.74
Number of square yards	917,031
Average cost per square yard	0.0219
Total Oiling	
Miles of streets oiled	61.647
Total cost	$25,258.41
Number of square yards	1,113,826
Average cost per square yard	0.02267

It will be noted that different grades of bituminous material have been used for this work, the purpose being to determine which will give the best results. The materials used have been Tarvia B, Texaco 110 penetration asphalt, Texaco 45 per cent asphalt or road

oil, and Indian Refining Company 200 penetration asphalt.

If all surface treatment had been applied on an 18-foot roadway, it would cover a distance of 556,913 lineal feet, or 105.47 miles.

Experiment with Gravel Spread Prior to Oiling

For experimental purposes, after some of the streets had been thoroughly cleaned, the pea gravel was spread first, after which the Tarvia B was applied. From our observations, it appears that the experiment has been successful for a high-crowned street, as the gravel will not have a tendency to roll down toward the gutter. It must, however, be admitted that it requires more bituminous material than otherwise.

Street Patrol Maintenance

The two street maintenance patrols are made up as follows: Two 2-ton Republic trucks, on each of which is mounted a tar kettle having a capacity of 135 gallons. The kettle is mounted at the rear of the truck. Two sheets of asbestos are placed on the truck body, over which is placed a sheet of 16-gage iron. Removable side-boards are placed between the cab of the truck and the kettle. In this space is kept a steel barrel which contains bituminous material that is applied cold. The rest of the space is used for stone. The two-wheel trailers are the type used by the aviation branch of the Army and were made into substantial trailers for hauling different sizes of stone. The front end of the trailer box was made pointed to assist in making shorter turns, and in this portion are kept the tools, picks and shovels. A cover is placed over this end, and a slot is cut in the face part to allow the tools to be kept under lock and key. On either side of the truck cab Pyrene fire extinguishers are mounted. The cost of the street patrol outfit is as follows:

2 2-ton Republic trucks (second-hand) $1,000 each	$2,000.00
2 135-gallon capacity kettles at $200	400.00
2 trailers at $91 each	182.00
Lumber and materials	80.00
Labor	88.00
Total cost of two street patrols	$2,750.00

The organization for this work consists of two foremen, two kettle tenders, two truck drivers, and two skilled mechanics. Each street patrol has a certain portion of the city to look after and must confine itself to macadam streets, to patch any and all surface breaks, and to repair all utility service ditches caused by the installation of sewer, water, gas, electric, telephone, or telegraph services. A flat rate of 20 cents per square foot is charged against any and all utility firms, corporations, or individuals. The city Sewer Department and city Water Department must pay to the Street Department the cost of 20 cents per square foot for all ditches patched.

Method of Making Patches

Surface breaks in the pavement are thoroughly cleaned and the edges squared off, after which they are painted with bituminous material heated to the required temperature. Then, stone is placed and thoroughly tamped, the size depending upon the depth of the fracture. This is followed with heated bituminous material, the amount depending on the size of the stone. Stone ranging from ¼-inch to ½-inch is then spread over the surface and thoroughly tamped. The surface is finally painted with a thin coat of light tar or asphalt.

Utility service ditches are patched as follows: The edges of the ditch are squared off and cleaned out to a depth of 3 inches. Stone ranging in size from 1¼ to 2½ inches is spread to a depth slightly below the surface of the pavement. The stone is thoroughly tamped, and heated bituminous material is applied at a rate of about 1.8 gallons per square yard. Then, stone ranging in size from ¾-inch to 1¼-inch is spread uniformly over the surface and this stone is thoroughly tamped, after which bituminous material is applied at a rate of ¾-gallon per square yard. Stone ranging in size from ¼-inch to ½-inch is then spread uniformly over the surface. The surface is thoroughly tamped and generally is between ¼- and ½-inch above the surface of the old street. The edge, however, is even with the old surface. In order to keep the fresh stone from being swept away by vehicles, the surface is treated with bituminous material applied cold.

We have been very successful in having men stay with the Department for some time, thus making experienced men available for our work. The foreman works as much as the men, and at the same time sees that everything is placed properly. The kettle-men keep the material heated to the required temperature and apply all the material; thus they become efficient in estimating the amount of material to apply. The truck drivers are required to assist the laborers in filling the holes with stone and in tamping. We have found that by using one gallon of bituminous material per square yard for every inch in depth, we secure the best results.

Forty Sample Lighting Circuits on One Street

Remarkable Full-Scale Street-Lighting Demonstration at Nela Park, Cleveland

ADEQUATE street lighting is a municipal necessity. Its benefits are directly allied with the aims of all who are encouraging civic advancement. Its services are rich contributions to the safety, comfort, and convenience of citizens. Yet street lighting has not kept pace with the increasingly rigid requirements imposed by the rapid growth of cities and by the addition of hundreds of thousands of motor-cars each year on the already congested streets. Where a city now has an unsatisfactory lighting system, the reason is not in most cases that the city has failed to appreciate the value of adequate street lighting. Usually it has been due to the lack of a comprehensive plan of development and to the difficulty of obtaining first-hand experience on the correct solution of the various problems involved.

THE DEMONSTRATION STREET BY DAY

A Comprehensive Plan

Rome was not built in a day. Neither is a modern system of city street lighting. As is equally true for any large project, the first essential in the development of a good street-lighting system is a thoroughly comprehensive plan. Briefly, this plan should consist of a careful zoning of all the streets in the city into various classifications based on their lighting requirements, and the adoption of a standardized lighting system for each classification. The table on page 622 shows the principal factors which should be covered in these standard systems and indicates values which represent good practice.

The adoption of a comprehensive plan does not mean that the entire city need be relighted at one time, although in some cases this is desirable, but it does insure that the extensions and revisions made over a period of years will form a part of a unified design. Otherwise, a haphazard variety of conglomerated equipment inevitably results. Such a tangle is happily avoided by using for all classes of streets a "family" of lighting equipment, consisting of globes and posts of similar design but of different dimensions and with different lamp sizes.

THE SAME STREET WITH ALL LIGHTS ABLAZE

A Standardized System

The streets of a city can be grouped into the various classifications without much uncertainty, but standardizing on a proper lighting system for each classification is more difficult.

THE NELA WHITE WAY

This is due to the fact that it is almost impossible to describe illumination. Lighting effects must be seen, they must be experienced to be appreciated.

To obtain first-hand knowledge on which to base the standardization of lighting systems, city councils have found it desirable to visit some distant city in which a far-sighted development program is reasonably complete. Not many cities, however, are in a position to serve as models, and in order to cover the subject thoroughly councils have had to visit several cities, requiring the expenditure of considerable time and money. Even where such a trip is made, much of the advantage of comparison is lost because of the lapse of time and the different conditions under which the various systems are seen.

A much better method is now available for the study of street-lighting effects, in Nela Park, Cleveland, Ohio.

Forty Streets in One

Through the cooperation of the city of Cleveland, the Cleveland Electric Illuminating Company, and the National Lamp Works, forty separate street-lighting circuits, representing forty different lighting systems, have been installed on a 2,000-foot stretch of city street near Nela Park, Cleveland. In this outdoor laboratory street-lighting principles and effects are demonstrated thoroughly and clearly. The 40 different systems include lamp sizes of 1,000 lumens (100 candle-power) to 30,000 lumens (3,000 candle-power), spacing distances of 75 feet to 900 feet, mounting heights of 11 feet to 26 feet, lighting units located from 2 feet back of the curb line to the center of the street, units with various types of light distribution, and systems in which the units are staggered, opposite, or all on one side of the street.

With this full-scale experimental station, the different lighting systems may be switched on at will and the lighting effect studied in detail and compared directly, and that system found which best meets the requirements of the particular problem under consideration. The technical problems of street-lighting design thus cease to be complicated and uncertain, and become simple and definite.

STREET-LIGHTING PRACTICE

Population of City	Classification of Street	Lumens per Post	Mounting Height, Feet	Lamp Spacing, Feet	Lumens per Foot of Street Minimum	Lumens per Foot of Street Desirable	Arrangement of Lamps on Street
100,000 or Larger	Principal Business	15,000–50,000	18–25	100–150	400	400–1000	Opposite
	Secondary Business	10,000–25,000	15–18	80–125	200	200–500	Opposite
	Principal Thoroughfares	10,000–15,000	15–20	100–150	70	70–200	Opp. or Stag.
	Boulevards and Parks	4,000–10,000	15–20	100–150	30	30–100	Opp. or One Side (O. S.)
	Secondary Thoroughfares Wholesale and Mfg. Dis.	4,000–10,000	15–20	100–150	30	30–70	Staggered
	Residential	2,500–4,000	13–20	125–200	15	15–30	Staggered
	Alleys in Business Section	2,500–4,000	16–20	125–200	15	15–30	One Side
	Outlying Streets and Alleys	1,000–2,500	16–20	200–300	3	3–8	One Side
30,000 to 100,000	Principal Business	10,000–30,000	15–20	80–125	300	300–500	Opposite
	Secondary Business	10,000–15,000	15–18	80–125	200	200–300	Opposite
	Principal Thoroughfares	6,000–15,000	15–20	100–150	40	40–150	Staggered
	Boulevards and Parks	4,000–10,000	15–20	100–150	30	30–100	Opp. or O. S.
	Secondary Thoroughfares	4,000–10,000	15–20	100–150	30	30–70	Staggered
	Residential	2,500–4,000	13–20	125–200	15	15–30	Staggered
	Outlying Streets and Alleys	1,000–2,500	16–20	200–300	3	3–8	One Side
5,000 to 30,000	Business	6,000–15,000	14–18	80–125	120	120–300	Opposite
	Principal Thoroughfares	4,000–10,000	15–20	100–200	30	30–100	Staggered
	Secondary Thoroughfares	4,000–6,000	15–20	100–200	20	20–60	Staggered
	Residential	2,500–4,000	13–20	150–250	10	10–20	Stag. or O. S.
	Outlying Streets and Alleys	1,000–2,500	16–20	200–300	3	3–8	One Side
5,000 or Less	Business	4,000–10,000	13–16	80–110	80	80–200	Opposite
	Thoroughfares	2,500–6,000	15–20	100–200	20	20–60	Stag. or O. S.
	Residential	4,500–4,000	13–20	150–300	8	8–15	Stag. or O. S.
	Outlying Streets and Alleys	1,000–2,500	16–20	200–300	3	3–8	One Side
Highways	Light Pavement	2,500–4,000	25–35	300–400	6	6–12	One Side
	Dark Pavement and Dirt Roads	2,500–4,000	25–35	200–300	8	8–20	One Side

After studying the technical features of street lighting, such as lamp size, mounting height, spacing, etc., the major consideration is the appearance of the lighting equipment. A direct comparison of the various types of equipment is as important in this study as it is in determining the correct technical features of the system. An opportunity for this comparison of appearance is afforded by the Nela White Way in Nela Park, Cleveland, which is an exhibition of ornamental street-lighting equipment comprising 19 different types of standards and lighting units, representative of the equipment of the large fixture and post manufacturers from all parts of the United States.

Municipal Power-Plant Employs Efficiency Engineer

Novel Contract of Brookings, S. Dak., Municipal Plant

By W. F. Schaphorst

THE enterprising city of Brookings, S. Dak., with a population of 4,000, has made an interesting contract with Verne C. Kennedy, who is to act as consulting engineer for the municipal electric light and power-plant. He will receive no salary from the city for his work, but is retained on a commission basis, to be figured on the increase in net earnings which it is expected that he will bring about over the net earnings of 1924. He will therefore receive no money if there is no increase in the efficiency of the plant. Otherwise, there will be no change in the management or personnel of the power-plant.

As stated before in THE AMERICAN CITY, Brookings has its own power-plant, central heating plant, water-works system, and telephone system. In addition to furnishing power and light for itself, it has a contract with the neighboring town of Volga, S. Dak.

Pipe Before Paving

A DEFINITE movement to prevent the making of cuts in newly paved streets for the purpose of installing pipe connections, is being inaugurated through the Signposting Department of the Automobile Club of Southern California. Warning signs are being posted on all streets where paving is contemplated or in progress, notifying property owners that they will save expense and trouble and increase their property values by making pipe connections before the paving is installed. One of these signs on a street that is greatly in need of the contemplated paving, is shown in the accompanying photograph. The wide-spread building program that has been going on in Los Angeles for years has necessitated thousands of street pipe connections monthly, and failure to make the connections for gas, electric light, water and sewer mains has caused much inconvenience and actual destruction of new pavement. Many freshly paved streets have been hardly opened to traffic before being punctured with a series of holes, most of which have been closed unevenly, ruining the very thing the paved streets was designed to furnish—a smooth-traveling surface for vehicles.

PROPERTY OWNERS ON THIS STREET IN LOS ANGELES ARE WARNED TO MAKE PIPE CONNECTIONS BEFORE THE STREET IS PAVED

Thousands of broken automobile springs, numerous accidents, and even personal injuries, have resulted. It is to remedy this situation that the Automobile Club is undertaking the large task of placing warning signs along all streets where paving is scheduled. If property owners will act upon the warning, the benefits will accrue not only to themselves, but to the city, the public utilities companies, and the public in general. A plan has been adopted of notifying the property owners by mail, in addition to placing the signs. This will make the warning effective in the case of property owners who do not live on the street on which their property is located.

The Board of Public Works of Los Angeles is in hearty accord with the work of the Automobile Club of Southern California, as is the Major Traffic Commission, which fathered the plan of general street improvement under way.

Gravel Road Maintenance

By J. T. Donaghey
State Highway Engineer of Wisconsin

GRAVEL road maintenance must begin the moment the material is in place on the subgrade and, to maintain the surface adequately, the following rules must be followed:

First: Be sure the road goes into winter quarters in the best of condition. Ditches and culverts must be free and open and the surface must be smooth and free from holes and depressions that will hold water. Add gravel where needed at this time.

Second: Go over the entire road (surface and ditches) with a 12-foot blade grader just as soon as conditions will permit, each spring. Move the top inch of gravel back and forth at least twice. This insures removing all holes and depressions, permitting the patrolman to begin the season's maintenance work with no handicap.

Third: Add new material at all places where the original material has been pounded into the subgrade by traffic. Add new material to the entire surface as fast as the original is ground up and blown away. This will be about ½-inch per year for each 200 vehicles per day travel.

Fourth: Keep a light mulch of fine gravel covering the surface at all times. The patrolman must move this mulch of gravel entirely across the surface once for each 800 vehicles of travel. As traffic increases, the patrol section must be shortened accordingly and the maintenance equipment increased in weight correspondingly.

Time to Do Work

We begin maintenance work very early in the spring, just after the frost has left the ground or as soon as the surface is thawed to a depth that will permit working a blade grader. At this time the gravel surface is somewhat loosened from the frost action and it is possible to cut off the high places and move them to the low places with more ease and more lasting results than at any other time during the season.

The ridge of gravel thrown outside the wheel tracks by traffic is moved in towards the center of the road with the blade grader and naturally fills the ruts, holes, and low places. All large stone projecting is removed from the surface before adding new material.

Material

If additional new material is needed, it must be made available along the roadside during the winter months and added at this time, as it will bond much better and more easily than at any other time during the season. Where new material is needed to fill the holes and low places, use gravel that has passed through a screen having round perforations not to exceed one inch in diameter, and containing but a small amount of binder.

When the holes and low places have been filled, the entire surface is gone over thoroughly with a grader having the blade set nearly at right angles, until a uniform and even surface is obtained. The blade is then set at the proper angle to shape up the surface to the proper cross-section, which should not permit more than a 3-inch crown for a 24-foot surface. The blade grader or planer is used frequently to keep the ruts filled, to assist in compacting the gravel, and to smooth up the whole surface.

Piles of fine gravel for use in maintenance are placed along the road at convenient points outside the ditch line where patrolmen can easily get the material necessary to fill the small holes and defects that may appear from time to time. The material is delivered to the road by motor truck or on sleighs during the winter months, provided the haul exceeds one mile.

If the patrolman has material available along the roadside, he can fill the holes immediately in the spring or after a rain, and the water standing in the low places will show him, better than can be shown in any other way, the exact depth of new material necessary to bring the low places to the proper crown.

Time to Use Grader or Planer

The best results are obtained with the blade grader or planer early in the season, just when the frost is leaving the surface, or after a rainy period of several days, at which time the entire surface has become so thoroughly soaked and softened up that material moved from the high places will bond readily where it drops into the low places.

Motor trucks are used to good advantage for pulling the grader or planer. An ordi-

nary 3-ton motor truck will pull a blade grader or heavy planer and do it very satisfactorily. This requires an extra man to handle the grader, but the extra expense is offset by the fact that this type of equipment is suitable for delivering material to the road.

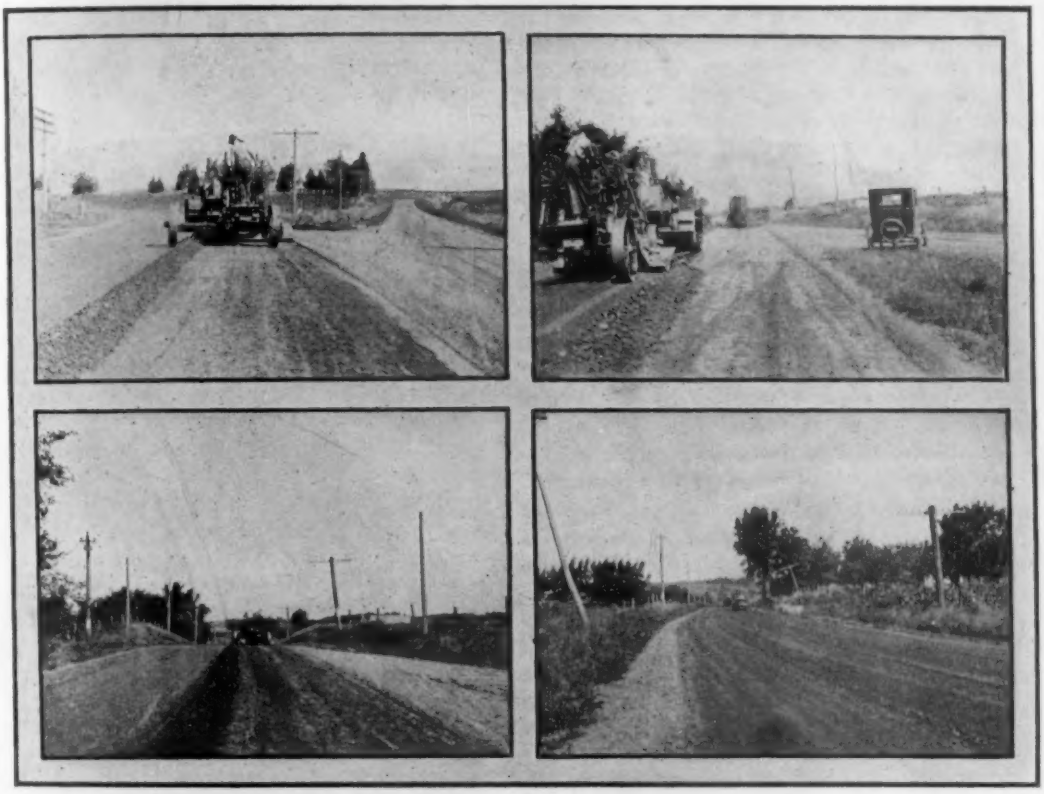
Motor graders do excellent surface maintenance work, but are not satisfactory for clearing out ditches. We find a good team patrol will cover a 6-mile section, a motor grader 13 miles, and a motor truck 20 miles. The team patrol is generally the best and cheapest.

Do not be afraid to use the grader or planer during dry weather on a gravel surface. The material thrown out by traffic should be moved in to assist in filling the depressions caused by heavy traffic and dry weather. All of the material will not remain in the depressions, but enough of it will to warrant the work. We find that on those gravel sections where the patrolman keeps moving the surplus fine material back and forth across the surface, even though the weather is dry, he invariably has the best-riding section.

Scarifying and Reshaping

Hundreds of miles of uneven gravel roads built in the past have been converted into excellent roads for travel by scarifying and reshaping. A roller-scarifier or an ordinary heavy grader-scarifier pulled by a heavy tractor is used. It is generally advisable to scarify to the entire depth of the gravel or at least to the depth of the deepest holes. Harrow thoroughly with a heavy peg-tooth harrow and shape up the surface with the blade grader. The blade should be set nearly at right angles in order to remove the waves and depressions. Remove loose stones from the surface and use the grader or planer daily until the surface is well compacted. Add fine gravel where needed to strengthen the weak places and fill all depressions.

Untreated gravel surfaces that carry an average traffic of 400 vehicles per day or more should be scarified and reshaped twice during the maintenance season—the first time as early in the season as the work can be done, and the second time about September 1. We generally have rains about this season, which



RESURFACING A GRAVEL ROAD

Upper left—Turning the surface after the first application (mixing method). Upper right—Covering the second application. Lower left—Moving material back and forth across road under traffic. Lower right—Showing surface as it begins to iron out

will assist in bonding the gravel that has been loosened up with the scarifier. The surface will be in much better condition to go through the fall and spring wet season than if the holes and washboarding are allowed to remain.

Surface Treatments

When traffic reaches an average of 300 vehicles or more per day, some form of surface treatment should be applied in order to protect the surface of the road from grinding up and blowing away. Up to this volume of traffic, there is probably no question but what the addition of the required amount of new material from time to time will keep the surface of the road in very good condition at a lower cost per mile per year than can be done by any form of surface treatment. We must consider the material lost annually, which is not less than 300 cubic yards per mile for an average daily traffic of 300 vehicles, and the danger and nuisance existing from the prevalence of dust.

Calcium Chloride

The application of calcium chloride or any other dust layer that does not form a surface that will serve traffic without the patrolman's constant attention with grader or planer, can hardly be classed as a surface treatment. On roads carrying an average of from 200 to 400 vehicles per day, however, quite satisfactory results can be obtained by the application of calcium chloride or similar dust layers. The surface must be shaped to the proper cross-section and reasonably well compacted before application. It requires an application of from ¼- to 1¼ pounds of calcium chloride per square yard for the first treatment. Generally, a second application must be made about midsummer, requiring from 50 to 75 per cent of the first application, making in all not to exceed 2 pounds per square yard per season. Calcium chloride is applied by the use of an ordinary lime spreader, and one outfit can apply two miles or more per day. Calcium chloride does two things; first, it lays the dust quite satisfactorily; and, second, it conserves the material on the road surface, not so much as bituminous surface treatments, but enough to be recognized as a considerable saving per mile per year. It is, however, a dry-weather treatment and works out much better during a dry season than it does if the season is especially rainy. During a rainy spell a surface treated with calcium chloride gets quite sloppy and pits out easily. It also requires constant and regular patrol maintenance.

There is no question but what this treatment is beneficial, especially upon those surfaces that are not bonded sufficiently to treat with light tar.

Light Asphaltic Oils

There are certain gravel roads constructed of such material that the surface is always covered with a heavy mulch of fine material that stays bonded only for a short time after each rain. On such roads a light oil surface treatment works out very satisfactorily and at a reasonable cost. The surface must be shaped up properly and the oil applied at the rate of about ½-gallon per square yard. After the oil has penetrated the fine mulch, it should be moved back and forth with a blade grader the same as untreated gravel would be handled, and must be gone over often enough with the grader or planer to keep it from becoming solid or shiny at any point. If there is evidence of its becoming hard and shiny, it is well to apply a small amount of fine material and move it back and forth over this portion of the surface, which will prevent such condition. This treatment will conserve the material, prevent dust, and is generally a satisfactory surface for one season. Frequently, however, it is necessary to give a light second application about midsummer. In this event, the cost will be increased to whatever extent is required by the second application. It will not require quite as much material per square yard the second year as the first. If no application is made the second year, however, the surface soon reverts to its original condition or worse. In other words, there is no lasting value in a light oil treatment. The total cost per mile per year, including new gravel and patrol maintenance, will range from $400 to $500. This form of surface treatment is generally satisfactory up to a daily average of 800 vehicles.

Light Tar

Where traffic reaches an average of 800 or more vehicles per day, the loss is not less than 1½ inches of surface annually, or not less than 400 cubic yards per mile. Very few localities have enough gravel available to construct and maintain their roads for a ten-year period unless such material is conserved to the maximum. A loss of 400 cubic yards annually would in five years provide sufficient material for a mile of new road. No community can afford this loss.

Material Used.—In the top 5 inches of a gravel surface we use no material that exceeds a size that will pass a 1-inch round opening. This material is not separated, but is all deposited in the same bin and loaded into trucks from a chute in the bottom of the bin. This insures a uniform gradation. The same specifications prevail on all resurfacing of old gravel roads. This costs somewhat more than pit-run gravel or gravel crushed to a larger size, but it is worth much more than the difference in such cost, especially where the surface must be scarified frequently.

Preparation for First Surface Treatment.—The surface is thoroughly scarified to a width of 20 feet or more, and to a depth of the deepest holes appearing in the surface, which is generally not more than 2 inches. It is necessary to lap the scarifier one-half in order to get the surface completely scarified, as material of this kind becomes extremely solid under heavy traffic, and a once-over with most scarifiers will not produce the desired results.

Immediately following the scarifier, the surface is shaped with a 12-foot blade grader to a uniform cross-section. The material is sometimes loose and dusty on account of the fine content, and a sufficient amount of time is permitted to elapse for the surface to become well compacted. A good, heavy rain will aid materially. The surface is now swept clean with a rotary broom. The sweeper is hauled by a motor truck and leaves quite a windrow of dust and loose gravel, so that a light grader is used to push the windrow out of the way of the sweeper for its second trip. The surface is swept twice, and after the second sweeping the coarser gravel in the surface projects just a little above the rest of the surface, producing practically a mosaic surface. Should there be any dust pockets remaining, they must be cleaned out with hand brooms. Some gravel surfaces may not need scarifying and are shaped up very satisfactorily with a heavy blade grader. This work should be done early in the spring, just as soon as the frost leaves the surface of the road.

Application of Priming Coat.—After the surface is swept clean, the tar is applied as follows: Light tar equivalent to Tarvia B may be applied cold, but better results will be obtained if it is heated to 100° F. The distributor should be thoroughly cleaned before beginning operations and then kept clean. There should be a double strainer on the distributor tank intake in order to exclude all cinders that may be in the tank-car, as it is almost impossible to secure a tank-car of tar that does not contain some cinders. It is also very necessary to have several extra nozzles so that if one becomes clogged it can be replaced immediately, which will permit the distributor to operate evenly. Even distribution is very essential.

The priming coat is applied at the rate of 1/6- to ¼-gallon per square yard on new surface treatments, and no sand or covering is spread over it. Forty-eight hours or more are permitted to elapse after the priming coat has been applied, during which time traffic irons out the surface in a fairly uniform manner. If the covering must be spread by hand and conditions will permit, immediately following the application of the priming coat the covering for the second coat should be deposited along the shoulder of the road. Be sure that the windrow of loose dust and gravel left by the sweeping has been pushed clear out over the shoulder with a grader before the covering is deposited along the shoulder, as the covering material should be located on the shoulder outside of the edge of the surface-treated portion and not be permitted to mix with the loose material swept off the surface.

Depositing the Covering Material.—Pea gravel, fine stone chips, or clean, coarse, sharp sand is the best material to use for covering, and for a 20-foot surface it will require about 50 cubic yards per mile to cover the surface properly. The covering should be deposited in piles of about ¼-cubic yard each, and 25 feet apart, and care should be taken that the inside edge of the pile be entirely clear of the outer edge of the surface-treated portion, for if a thin film of covering opposite the piles should be covered with the second application of tar, it would pit out at that point and produce very unsatisfactory results.

The reason for depositing the covering in advance of the application of the second coat is that a certain amount of covering must be applied immediately after the second coat of tar touches the surface, which prevents the tar from running and permits it to penetrate the surface, thereby forming a skin coat and not a mat. The covering, if deposited along the shoulder, is also available to add immediately in any amount desired to prevent picking up and to cure bleeding.

Application of Second Coat.—Should several days have elapsed before the second coat is applied and the surface be slightly loosened or dirty, it should again be swept lightly to

remove any loose material. The distributor is now set to spread about ⅓-gallon per square yard on a first surface treatment, and care must be taken to have the tar spread uniformly.

Where the covering is spread by hand, a number of men (from six to ten) are stationed along the sand piles from 50 to 100 feet apart. When the distributor is started along the road, the man at the first pile spreads a little less than one-quarter of the covering in his first pile on the width covered by the distributor opposite the pile, doing the same with the next pile, and so on, working rapidly. The second man does likewise when the distributor reaches a point opposite his first pile, and so on down the line of men. The first man, upon reaching a point where the second man started spreading, moves ahead of the line of men, beginning a new station the required distance from the last man in line. Handling the covering in this manner permits applying a small amount immediately after the tar touches the surface of the gravel, and, as stated before, prevents the tar from running off the road surface and assists it in penetrating the gravel, which is what is desired. To do this part of the work cheaply and rapidly, on a large mileage, there should be two or more distributors on each job, one being loaded while the other is distributing. A certain amount of time will naturally elapse between the loads, which permits the sand spreaders to go back and add sand where needed to keep the tar from running off the surface or to stop picking up. The distance of the job from the supply of tar will of course enter into the question. The other side of the road is handled in just the same manner, and the distributor should be so equipped that two trips over the road will cover adequately the width of surface desired.

Extreme care must be taken to avoid spreading too much covering on the second coat until it has had time to penetrate the surface. If too heavy a covering is spread, or if the spreaders are careless and dump full shovels in a place, the excessive amount of covering will absorb or blot the tar and prevent it from penetrating the surface, and will result in a mat rather than a skin coat. The spreaders should use square-point shovels and learn to throw the covering from the shovel in a manner that will produce an even application.

If the weather is reasonably warm, penetration will immediately take place, and after two hours have elapsed there is very little danger if more covering than is necessary is applied, as the tar will then have penetrated sufficiently so that the excessive covering will not blot the tar. One or two extra men should be kept on each mile for at least a day or two following the second application, to apply covering where the surface starts to pick up or bleed, and a small amount of material should be left in about every third pile for this purpose.

Mechanical sand spreaders may be used, but if used, not to exceed one-fourth of the total covering required should be spread immediately following the distributor, an additional 50 per cent in about two hours, and the remainder as needed to cure picking up or bleeding.

The most practical and convenient mechanical device for spreading sand, pea gravel, or stone chips that the writer has seen in operation is being used in Dane County, Wis. It was designed by the county mechanic. It will spread evenly at the rate of 20 cubic yards per mile of 20-foot width or any desired thickness in excess of that. It is very simple, can be attached to any dump body truck, and is not expensive to construct or attach.

Patching the Surface.—The patching material is composed of from 15 to 17 gallons of light tar equivalent to Tarvia B, mixed thoroughly with 1 cubic yard of coarse, sharp sand. The material must be mixed thoroughly either by hand or in a mixer, and if it stands several weeks prior to being used after mixing, all the better. The volatile oils evaporate, and when thoroughly cured the mixture makes a better patch and will stay in place much better. Patching material mixed the previous year has shown more satisfactory results than when used fresh. No more than 17 gallons of tar per cubic yard of sand should be used, even though it is slow in mixing.

Those in charge of maintenance must watch the surface very carefully, especially the first ten days after the surface treatment is applied. If a hole or abrasion appears in the surface, the loose material should be swept out clean and the hole filled with patching material. If there are any places that appear loose and do not harden up under traffic, they should be dug out to a depth where solid material prevails, the hole should be filled and the material well tamped in and given an application of tar, and in a few days covered with a coat of patching material. The patch will soon iron out and become equal to the rest of the surface. The patrolman

must be sure to fill every hole just as fast as it is noticeable to the eye, even though it is not more than the size of a silver dollar.

To Insure Success, Watch These Points

The outstanding points to insure satisfactory results are:

First: Do not add more than one inch of new material during the season in which the treatment is given. In other words, if a gravel road is to be surface treated, any additions in material required in the line of resurfacing should be applied the previous season and permitted to compact during the late fall, winter, and spring. However, light applications of ½ to 1 inch can be made early in the spring, with good results the same season. This material should be placed before scarifying the surface.

Second: The surface must be well compacted and uniform.

Third: The surface must be swept clean.

Fourth: The priming coat must be applied immediately after sweeping.

Fifth: The tar must be uniformly spread.

Sixth: The covering must be spread evenly, and a little less than 50 per cent of the required amount spread immediately following the distributor, the remainder being applied later as required.

Seventh: If possible, close the road to traffic for twenty-four hours after the second coat is applied.

Eighth: The surface treatment must be followed up promptly and carefully by the patrolman or maintenance gang, and patching material must be added just as soon as the slightest hole is noticeable on the surface. A well-prepared surface should not require more than 7 cubic yards of patching material per mile per year.

Ninth: Unless plans are made to patch every hole the moment it appears, it is better not to attempt to maintain a gravel road with this type of treatment.

Approximate Costs

The first tar surface treatment of a gravel road 20 feet wide will cost from $900 to $1,200 per mile. This includes the necessary preparation of the surface, the follow-up maintenance, and the entire patching cost for the season.

Preparing the Surface for Re-treatment

Where a road has been previously treated by this method, preparation for re-treatment is as follows: Any portions of the surface that are in perfect condition, showing no holes, ridges or wrinkles, may be re-treated without scarifying or breaking up with a blade grader. Under these conditions, 2/10- to 3/10-gallon per square yard should be sufficient.

Those portions that are slightly uneven should be gone over with a heavy blade grader early in the spring when the tar skin coat is inclined to be loosened up a trifle from frost action and weather conditions, pushing the skin coat out to the shoulder of the road with the grader and following this up with a light blade grader such as is used in patrol work, moving the material pushed to the side of the road back and forth across the surface of the road every other day for a week or two. The best results are obtained when the temperature is from 60 to 70 degrees F.

This breaks up the old tar crust, and the grader operations smooth up the surface of the road to a point where it is practically a perfect cross-section. When the surface has become smooth and well compacted by these operations, it is swept clean and the covering material placed in piles along the edge. The tar is applied in the same manner as outlined above, and generally no priming coat is required. Should the surface require a priming coat, it should not be in excess of 1/6-gallon per square yard. The coat required for the second year's surface treatment is approximately 1/3-gallon. The third year and thereafter a less amount is required, unless additional width is treated.

The application of tar, spreading the covering, the follow-up patching, and everything else connected with the work is done just the same as on a new surface treatment.

The Mixing Method

Where the gravel surface contains but little binder and the surface is not well bonded, very good results may be obtained by applying the tar without sweeping the surface. The surface is brought to the proper cross-section with a blade grader, and immediately following this an application of ⅓-gallon per square yard is spread over the full width of the road.

About two hours is permitted to elapse after applying the tar, to allow it to penetrate the loose surface. However, traffic can pass over the surface almost immediately following the distributor, and will splash but little tar on the vehicle, because the tar immediately penetrates the loose gravel surface. Two 12-foot blade graders are now used to move the

top ¾-inch of surface over well beyond the center of the road. Immediately following the second grader, the distributor applies ⅓-gallon of tar per square yard on the solid gravel. Immediately following this, the graders push the loose material from the other side over to the opposite side of the road, and the tar is spread on the other half of the solid gravel. The loose material is now moved back and forth across the road surface three or four times. The blade is set at about a 45-degree angle so that it will roll the material along the blade, which assists materially in mixing the tar and gravel. When the loose material has been mixed until it is all coated with tar, it is then spread out with the blade grader to a uniform thickness over the surface. Traffic is permitted to use it immediately; in fact, traffic is never shut off on this type of treatment. A light grader or planer is used continuously until the surface is thoroughly ironed out and well compacted, which will take about two days where travel reaches a thousand vehicles or more daily. Where traffic is less than this amount, it will take slightly longer to iron out and become well compacted.

After the surface is well ironed out, a seal coat of about 1/6-gallon per square yard is applied, followed immediately with a very light covering of pea gravel. The planer is again put in operation and moves the surplus pea gravel from the high spots to any depressions in the surface, resulting in a very uniform and smooth surface within a week or less.

This method requires about 5/6-gallon per square yard and, of course, necessarily costs more than the ordinary surface treatment heretofore described. It insures a penetration of approximately one inch and also insures that the entire surface shall be well bonded with tar. We find this type requires much less patching and less attention than the ordinary surface treatment. We tried out a mile of this type in 1923 and it came through the 1924 season without a re-treatment. Therefore, at the end of the two seasons it was cheaper than the ordinary surface treatment.

We are very much "sold" on this latter type and are satisfied that more of our treatments will be along this line from year to year.

In Wisconsin we find it practically impossible to get appropriations sufficient to build all our main lines of travel with high-type surfaces, and we do find that we can maintain our gravel surfaces in a very adequate manner with light tar surface treatments, giving the public a safe and pleasant road to drive on, and conserving our local materials by so doing until such time as funds can be provided for a high-type surface.

ACKNOWLEDGMENT.—From a paper read at the Purdue University Road School, Lafayette, Ind.

The Street-Lighting Program of Indianapolis

The New Contract and the Extension of Improved Lighting Are Features

MORE than 4,000 new street-lighting units are being installed in the business and residential sections of Indianapolis, which has decided to carry out a large program of lighting improvement. The Merchants Heat and Light Company, which has been awarded a 10-year lighting contract by the municipality, has ordered 1,378 G. E. Novalux lighting units with rippled alabaster globes and canopies for mounting on standards, and 2,750 Novalux pendant units with light alabaster rippled globes, each equipped with an internal dome refractor. These will replace globe and series flame arcs.

For the last ten years and under the terms of the old contract, the business streets of Indianapolis have been lighted by 150-watt multiple lamps in 16-inch ball globes, mounted on 11-foot posts and spaced approximately 85 feet apart on both sides of the street, and at some intersections in the business district by pendant 10-ampere, alternating-current, series flame arc lamps supported on tubular steel poles and mast arms. All the streets in the residential section were illuminated by 10-ampere, alternating-current, series flame arc lamps.

In the principal business district, the new system will consist of 225 two-light ornamental Union Metal standards equipped with Novalux lighting units. These units will have medium alabaster rippled globes and canopies, enclosing 15,000-lumen, 20-ampere incandescent lamps. The standards will be placed opposite each other at intervals of about 105 feet, and the light source will be 19 feet above the sidewalk.

Single-light Union Metal standards, equipped with the same Novalux unit and 15,000-lumen lamps, will be used in the secondary business districts. The standards will be installed in parallel and in staggered formation, depending on the character of the street and the intensity of illumination required. The spacing will vary from 105 to 125 feet.

An interesting and inexpensive feature of the standards for the business district is that whenever the city desires an extension of the twin-light unit, the single-light standards, which are 14 feet 10 inches high, can be changed into two-light standards 19 feet high, merely by the application of a top ornament and without the necessity of setting a new pole.

In the residential section the new installation will consist partly of units on standards and partly of pendant units. The residential section standards in the installation will include 1,149 Union Metal

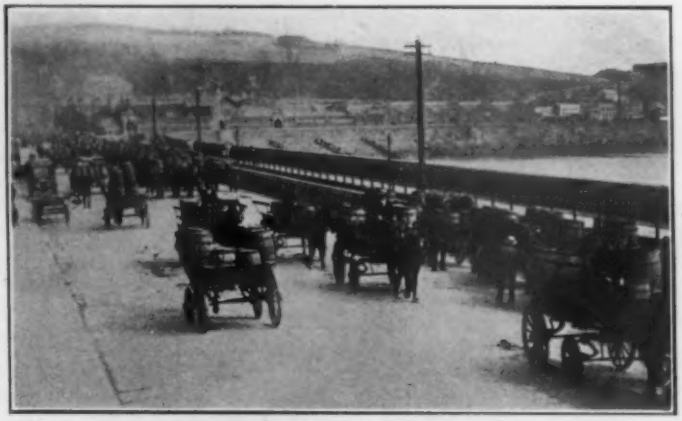
standards equipped with Novalux units, furnished with light alabaster rippled globes and canopies, 453 of them being equipped with 6,000-lumen, 20-ampere lamps, and 696 with 4,000-lumen, 15-ampere lamps. The standards will be spaced at intervals of approximately 125 feet and will be placed opposite each other. An individual lamp transformer will be mounted in the base of each standard, and the primary winding will be connected to a 10-ampere, alternating-current, series underground circuit. Part of the underground circuit will be 5,000-volt lead-covered cable in ducts, and part will be 5,000-volt lead-covered and armored parkway cable.

The overhead pendant Novalux units will have light alabaster rippled globes with an internal dome refractor. They will be equipped with 10-ampere primary compensators for either 10,000 or 6,000-lumen incandescent lamps, so that the fixtures can be placed on the same circuit and controlled by the 10-ampere regulators which were used formerly for operating the 10-ampere flame arcs. Three thousand of these units will be used this year to take the place of the flame arcs. Of these, 2,200 will be equipped with 10,000-lumen, 20-ampere lamps, and 800 will be operated with 6,000-lumen, 20-ampere lamps. All these will be operated all night on a schedule of 4,000 hours per year.

A total of 2,297 ornamental units will be installed this year, of which 1,147 will be operated on an all-night schedule of 4,000 hours per year, and the remaining 1,150 part of the night on a schedule of 2,000 hours per year.

Asphalt Paving in the Channel Islands of England

LYING between England and France in the English Channel is an interesting and picturesque group of islands known as the Channel Islands, which are numbered among the possessions of Great Britain. The beauty and unusual opportunities for diversion to be found in these islands draw tourists all the year around. The largest member of the group is the island of Jersey, and its capital is the bustling town of St. Helier. The accompanying photograph shows the town's new asphalt pavement. The traffic, consisting of scores of iron-tired wagons, is carrying a part of the island's great potato crop. During the height of the potato harvest, daily traffic on this road often reaches more than 11,000 tons. The pavement runs alongside the water and consequently is subjected to extremes of temperature which are often severe.



MOVING THE POTATO CROP OF JERSEY, ONE OF THE CHANNEL ISLANDS, OVER A MODERN HARD-SURFACED TEXACO ASPHALT PAVEMENT

The character of the pavement is somewhat similar to the asphaltic concrete and sheet asphalt types found in this country. The road surface which preceded the asphalt consisted of local granite, the fate of which was like that of so many miles of the old macadam and gravel in the United States. Increasing traffic proved too much for it.

The new asphaltic pavement was laid upon the old granite in two courses. The under or binder course was 2½ inches thick and the top course 1¼ inches, giving a total depth of 3¾ inches. The binder course consisted of run-of-crusher clinker varying in size from 1½ to ⅜-inch, with 9 per cent of asphalt having a penetration of between 60 and 70. The wearing course consisted of run-of-crusher clinker varying from ⅜-inch to dust, with about 14 per cent of Texaco asphalt having a penetration of from 50 to 60.

The entire work was executed by the town's own labor and was handled in an efficient and workmanlike manner.

The Value of Research in Highway Work

SOME engineers and officials do not realize just exactly what research means in dollars and cents to the public. One of the best examples of savings through research is the use of the thickened edge in the design of concrete roads. By this design, which is the result of extended research, a saving has been made of about 390 cubic yards of concrete per mile. At $10 per cubic yard, this is a saving of $3,900 per mile. There are 24 states that have adopted this new design. If in these states 2,400 miles of concrete roads are constructed per year, the saving effected amounts to $9,360,000. Other equally important savings from improved designs will follow as research work is developed, according to facts brought out at the Fourth Annual Meeting of the Highway Research Board.

As another example, the Iowa Highway Commission has been able by intensive laboratory research to develop means of appropriately using non-standard aggregate in concrete construction. In building 74.35 miles of concrete pavement during 1920 and 1921, $155,638 was saved to the state through the successful work of its laboratories.

Saturday Morning Movies for Youngsters

By Jason S. Joy

Director, Department of Public Relations, Motion Picture Producers and Distributors of America, New York

WITH the practical aid of the large group of corporations which make and circulate motion pictures under the guidance of Will H. Hays, augmented by the interest and cooperation of many theater owners whose business it is to show pictures, there will be in operation this summer in 32 "key cities" of the United States special performances on Saturday mornings for boys and girls, admission to which will be the modest sum of ten cents.

The very best sort of movies will be displayed for the youngsters. Every picture shown will have the endorsement of our Department, which means the endorsement of Mr. Hays. Parents and guardians may send their children to these performances with complete confidence that what the youngsters see will be altogether wholesome and beneficial.

We feel that these showings will be of great aid in solving the so-called problem of "The Child and the Movie." We have learned that there is a real demand for clean, brisk entertainment suitable to the adolescent mind, and experiments have proved to us that youngsters will support with enthusiasm these holiday morning movie shows. A large number of theater owners have experimented with the plan and have been won over to it, although some of them at first may have regarded it with a certain degree of skepticism.

At a recent Saturday morning movie show in Atlanta, 1,400 boys and girls attended in spite of a downpour of rain. A showing in Jacksonville brought out 1,340, and another in South Norwalk, Conn., drew 1,184. There is every reason to believe that these special showings will prove popular with the boys and girls everywhere. The beginning of these ten-cent movie shows on a wide geographical scale will be the culmination of a year's hard work by this Department.

When Mr. Hays suggested to the executives of his member companies that such a plan might be effective in many ways, they agreed at once to throw open their film vaults and permit us to select therefrom all the material we wanted, provided it was not currently being shown at movie theaters charging the usual scale of prices.

Our survey experts found an enormous mass of splendid material. In fact, at their disposal were all the great feature pictures of the past, together with innumerable comedies, travel pictures, and other films which possess educational as well as entertainment value.

Fifty-Two Complete Programs Selected

From among 3,300 selected reels, material enough was chosen to complete 52 distinct and complete programs—in other words, a year's supply—each program consisting of eight reels, generally divided up into a five-reel feature, a two-reel comedy, and a one-reel scenic or industrial subject. The following is a typical program:

"The Split Outfit," a one-reel Bruce Wilderness tale from Educational Film Exchanges, Inc.

"Snookie's Treasure Island," a two-reel comedy from the same company, in which a boy and

a monkey have a wonderful adventure.

"Excuse My Dust," a five-reel humorous automobile story with Wallace Reid as the star, produced by Famous Players-Lasky.

Good judgment had to be used in order to make sure that there was not too much juvenility about the films, because the Saturday morning movie patrons are generally between the ages of 12 and 16, and they would not patronize "baby stuff." Again, care had to be exercised that there was not too much material on the program of an obviously educational nature. The average boy or girl, as we all know, feels that the classroom provides all the educational subjects necessary during the five school days of the week, and will shy away from the presentation of more of them on Saturday. Such mistakes were avoided, however, and we feel that we have well-balanced, entertaining programs. The following is another example:

"The Chase," from Educational Film Exchanges, Inc. Hans Schneider, the world's champion ski-jumper in a thrilling race on the Alps. Two reels.

"Trifling with Honor," from Universal Pictures Corporation, the story of a great baseball player of the Babe Ruth type, admiration for whom works beneficially on a boy. Five reels.

A split-reel subject—"Dew Fall," Gutzon Borglum and the debut of Thomas Cat, from Bray Productions, Inc. One reel.

Our complete programs are fitted into special metal containers and will be physically distributed in the various cities by members of the Hays group of distributors who have the best facilities. Thus far, 36 complete programs have been assembled, edited, and packed, and probably by the time these words reach print, the entire 52 will be assembled.

Cities Already Selected

The cities in which the Saturday morning movies will be shown at first are: Albany, Atlanta, Boston, Buffalo, Butte, Charlotte, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Des Moines, Denver, Kansas City, Indianapolis, Los Angeles, Milwaukee, Memphis, Minneapolis, New Haven, New Orleans, New York City, Oklahoma City, Omaha, Philadelphia, Pittsburgh, Portland, Rochester, Salt Lake City, Seattle, San Francisco, St. Louis, and Washington.

It is expected—and I do not think that we are too hopeful—that these special showings for boys and girls will extend into the smaller cities and eventually to the towns and villages. They have several good results. Parents may unhesitatingly send their children to these guaranteed showings and thus satisfy the very natural love of the movies that is in every child's heart. At the same time, they may be sure that the youngsters will be shown only that type of motion picture that will inculcate a taste for the most wholesome. These special performances, it is hoped, will curb, to a considerable degree at least, the tendency of young boys and girls to attend other pictures which are now, and always will be, primarily for adult viewing.

Police and Street Mileage Statistics of 167 American Cities

THE following tables have been compiled from data gathered by the National Automobile Chamber of Commerce and made public in a special bulletin dated March 31, 1925. In three population groups there are given for 167 cities the total number of police on the force; total number of traffic police; total number of motor-cycle police; and total street mileages. Certain averages for each of the population groups are also given.

Cities Having More Than 100,000 Population

Number of persons to every traffic officer, 7,211.

Number of motor vehicles to every traffic officer 1,348.

Per cent of police force assigned to traffic duty, 11 *per cent.*

Population of City	City	Total Number of Police on Force	Total Number of Traffic Police	Total Number of Motor-Cycle Police	Total Street Mileage
222,963	Atlanta, Ga.	353	77	17	34
773,580	Baltimore, Md.	1,250	135	25	840
195,901	Birmingham, Ala.	109	26	12	....
770,400	Boston, Mass.	1,978	177	35	900
143,555	Bridgeport, Conn.	275	49	16	201
111,444	Cambridge, Mass.	214	18	2	126.183
124,157	Camden, N. J.	225	31	20	250
2,886,971	Chicago, Ill.	5,989	534	70	....
406,387	Cincinnati, Ohio.	767	87	0	1,000
888,519	Cleveland, Ohio.	1,392	230	26	1,029
261,082	Columbus, Ohio.	311	41	10	379
182,274	Dallas, Texas.	221	18	0	....
165,530	Dayton, Ohio.	199	24	4	285
272,031	Denver, Colo.	345	20	0	900
140,923	Des Moines, Iowa.	150	18	4	550
995,668	Detroit, Mich.	2,385	180	90	1,500
106,289	Duluth, Minn.	123	6	4	1,000
120,912	Fall River, Mass.	217	7	4	41 sq. mi
143,821	Fort Worth, Texas.	165	22	18	650
145,947	Grand Rapids, Mich.	202	27	15	363

Population of City	City	Total Number of Police on Force	Total Number of Traffic Police	Total Number of Motor-Cycle Police	Total Street Mileage
155,170	Houston, Texas	230	46	12	62
100,046	Jacksonville, Fla.	126	15	14	361
309,034	Jersey City, N. J.	825	40	30	203
351,819	Kansas City, Mo.	646	65	8	600
674,641	Los Angeles, Cal.	2,364	224	55	3,870
257,671	Louisville, Ky.	380	50	9	....
115,089	Lowell, Mass.	170	13	7	217
170,067	Memphis, Tenn.	200	41	11	690
484,595	Milwaukee, Wis.	705	78	35	513
409,125	Minneapolis, Minn.	502	36	10	881
130,072	New Bedford, Mass.	260	22	4	210
172,967	New Haven, Conn.	282	79	15	207
404,575	New Orleans, La.	654	114	26	215
5,927,625	New York, N. Y.	13,150	1,775	172	3,900
240,086	Oakland, Cal.	324	35	12	580
204,382	Omaha, Neb.	260	20	8	695
139,579	Paterson, N. J.	219	38	[17	207
620,367	Pittsburgh, Pa.	764	103	[48	1,200
273,621	Portland, Ore.	350	41	12	1,219
242,378	Providence, R. I.	503	51	[11	282.71
181,044	Richmond, Va.	235	30	4	261½
318,892	Rochester, N. Y.	404	68	4	485.6
803,853	St. Louis, Mo.	1,849	81	36	....
241,891	St. Paul, Minn.	336	21	29	839
126,241	Salt Lake City, Utah.	130	8	10	525
539,038	San Francisco, Cal.	1,100	100	15	870
140,636	Scranton, Pa.	159	17	9	194
315,685	Seattle, Wash.	565	16	11	1,118
104,573	Spokane, Wash.	110	5	2	960
144,227	Springfield, Mass.	258	64	6	178.713
101,731	Tacoma, Wash.	105	6	6	324
269,338	Toledo, Ohio	389	28	21	296 (P)
127,390	Trenton, N. J.	165	35	2	141.83½(P)
103,457	Utica, N. Y.	138	18	13	150
437,571	Washington, D. C.	1,130	63	56	699
117,728	Wilmington, Del.	180	26	8	151
191,927	Worcester, Mass.	355	40	37	38
107,520	Yonkers, N. Y.	236	36	14	....
132,358	Youngstown, Ohio	112	14	4	250

(P) Paved.

Cities Having 50,000 to 100,000 Population

Number of persons to every traffic officer, 10,094.

Number of motor vehicles to every traffic officer, 1,857.

Per cent of police force assigned to traffic duty, 17 per cent.

Population of City	City	Total Number of Police on Force	Total Number of Traffic Police	Total Number of Motor-Cycle Police	Total Street Mileage
[64,458	Altoona, Pa.	34	15	2	94.72
[52,349	Atlantic City, N. J.	275	60	6	74.7
[62,995	Berkeley, Cal.	37	2	2	190
[73,416	Binghamton, N. Y.	87	8	6	158
69,633	Brockton, Mass.	96	10	0	138
99,248	Canton, Ohio	64	4	2	275(P)
64,697	Chester, Pa.	66	5	..	....
57,877	Covington, Ky.	64	8	2	60
61,262	Davenport, Iowa.	65	5	2	185
96,319	El Paso, Texas	100	10	7	105(P)
93,673	Fort Wayne, Ind.	115	9	4	273
54,966	Fresno, Cal.	66	15	3	185
69,054	Gary, Ind.	105	6	6	333
57,405	Haverhill, Mass.	59	4	1	155
61,094	Holyoke, Mass.	85	8	2	73.31
51,749	Kalamazoo, Mich.	50	6	3	160
88,869	Knoxville, Tenn.	89	16	4	481
51,304	Lakewood, Ohio.	39	2	6	90
55,285	Lancaster, Pa.	47	8	4	68
65,871	Lansing, Mich.	52	2	4	208
58,761	Lincoln, Neb.	29	0	5	133(P)
70,916	Little Rock, Ark.	65	11	5	415
69,214	Long Beach, Cal.	160	35	8	32 sq. mi.
81,383	Manchester, N. H.	122	11	3	216
64,867	New Britain, Conn.	65	6	2	115
53,388	Pasadena, Cal.	61	7	4	13 sq. mi.
67,111	Passaic, N. J.	102	24	3	....
79,675	Peoria, Ill.	86	11	3	....
73,129	Portland, Maine	135	12	7	198
53,368	Quincy, Mass.	101	10	4	190
64,393	Racine, Wis.	51	0	7	135
72,419	Rockford, Ill.	72	14	6	213.66
69,950	Sacramento, Cal.	82	7	4	....
60,754	Saginaw, Mich.	89	7	8	....
89,448	Savannah, Ga.	110	5	8	152
98,773	Schenectady, N. Y.	149	7	18	45
54,590	Shreveport, La.	55	10	2	100
79,662	Sioux City, Iowa.	75	7	6	710
76,859	South Bend, Ind.	100	9	5	165(P)
65,857	Springfield, Ohio.	41	7	..	168.95
78,232	St. Joseph, Mo.	60	8	8	13
66,050	Tampa, Fla.	92	10	8	130
72,013	Troy, N. Y.	165	15	7	105 sq. mi.
98,411	Waterbury, Conn.	162	17	4	200
56,208	Wheeling, W. Va.	75	3	7	11 sq. mi.
79,261	Wichita, Kans.	91	7	9	450
58,230	Winston-Salem, N. C.	80	16	8	....

(P) Paved.

Cities Having 25,000 to 50,000 Population

Number of persons to every traffic officer, 4,849.

Per cent of police force assigned to traffic duty, 18 *per cent.*

Population of City	City	Total Number of Police on Force	Total Number of Traffic Police	Total Number of Motor-Cycle Police	Total Street Mileage
30,759	Alameda, Cal.	31	...	2	70
30,394	Asheville, N. C.	48	8	2	90
36,742	Auburn, N. Y.	38	2	4	66
26,402	Bangor, Maine	40	12	2	117
48,415	Bay City, Mich.	50	2	3	50(P)
29,709	Bloomington, Ill.	32	6	2	37
41,336	Brookline, Mass.	110	8	2	75
40,111	Chicopee, Mass.	42	0	2	....
29,480	Clarksburg, W. Va.	29	6	4	85
31,734	Clifton, N. J.	43	7	4	160
32,398	Cranston, R. I.	26	4	2	250
32,361	Cumberland, Md.	24	6	3	62
48,439	Decatur, Ill.	34	34	2	64
39,372	Dubuque, Iowa.	40	1	2	140
33,820	East Cleveland, Ohio.	34	8	7	42
35,720	Easton, Pa.	38	12	5	....
27,987	Elgin, Ill.	21	5	1	127
48,354	Elmira, N. Y.	61	12	8	122.221
42,511	Everett, Mass.	57	5	2	56.24
42,183	Fitchburg, Mass.	45	3	2	147
46,877	Galveston, Texas	72	5	4	128
34,737	Hazleton, Pa.	14	6	..	109
69,689	Hamtramck, Mich.	84	9	7	....
46,662	Kenosha, Wis.	46	3	6	122
26,969	Kingston, N. Y.	28	4	2	108
34,565	Kokomo, Ind.	30	6	2	....
33,790	Lewiston, Maine	34	3	2	175
43,673	Lexington, Ky.	42	10	1	72.2
44,757	Lima, Ohio	27	3	2	100
40,527	Lorain, Ohio	24	2	1	120
42,519	Madison, Wis.	49	11	2	....
30,366	Mansfield, Ohio	21	5	2	80
35,736	Meriden, Conn.	30	6	2	120
22,754	Moline, Ill.	23	1	4	98
31,426	Montclair, N. J.	52	16	7	90
29,234	Nashua, N. H.	40	3	1	125
30,191	Newark, Ohio	19	...	..	80
31,288	Newburgh, N. Y.	31	6	3	48
31,374	Newport, R. I.	70	10	3	96
35,596	Newport News, Va.	45	6	2	57
38,860	New Rochelle, N. Y.	107	22	8	109
33,920	Norristown, Pa.	25	4	2	42
29,015	Norwalk, Conn.	30	5	3	35
35,391	Ogden, Utah	12	2	2	....
34,629	Orange, N. J.	53	7	5	38
33,197	Oshkosh, Wis.	36	12	4	125
34,294	Petersburg, Va.	37	5	1	100
45,162	Perth Amboy, N. J.	59	10	3	75
45,239	Pittsfield, Mass.	53	8	2	105
37,478	Quincy, Ill.	50	6	1	120
28,447	Rome, N. Y.	19	3	2	40
42,529	Salem, Mass.	68	8	1	....
41,228	Springfield, Mo.	36	6	2	....
38,685	Stamford, Conn.	60	13	6	....
39,671	Superior, Wis.	59	2	3	107
38,173	Taunton, Mass.	60	8	2	150
31,905	Warren, Ohio	24	1	1	4
32,927	Watertown, N. Y.	32	4	4	80
41,762	Williamsport, Pa.	34	12	3	6
35,719	Wilmington, N. C.	41	5	0	80
48,506	York, Pa.	38	4	3	90

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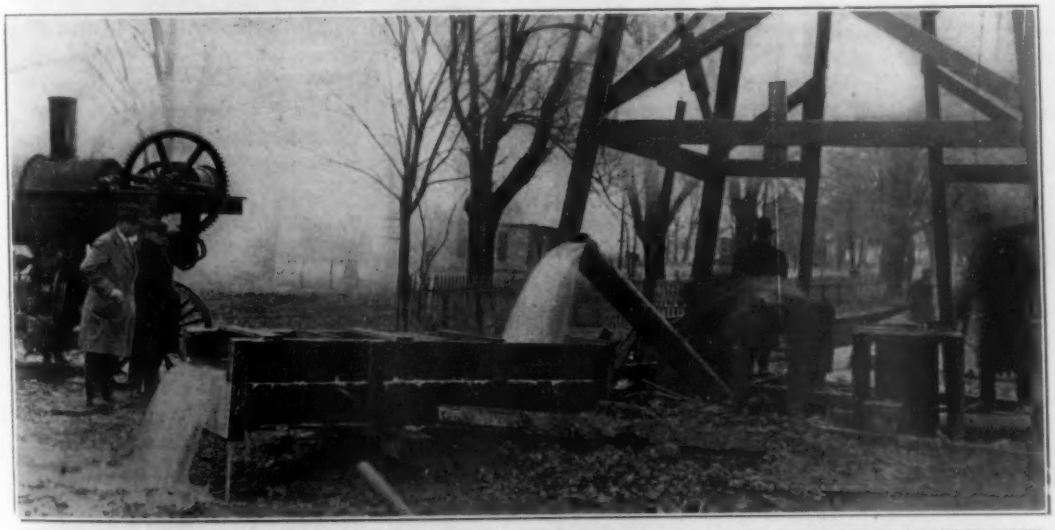
Development of the New Well-Water Supply for Mt. Pulaski, Ill.

By W. H. Stafford
Superintendent of Water-Works, Mt. Pulaski, Ill.

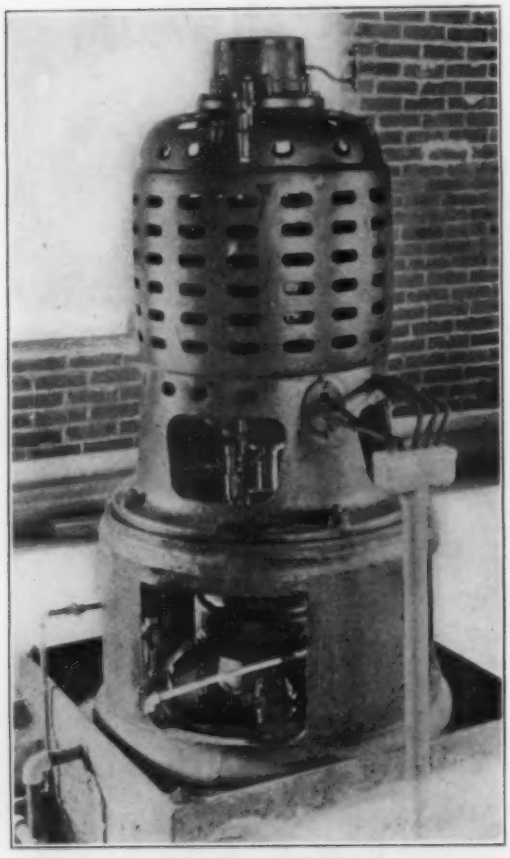
IN the summer of 1922, the city of Mt. Pulaski, 30 miles from Springfield, the capital of Illinois, began prospecting for water in the south part of the town, hoping that a sufficient additional supply could be located near the old water-works established in 1895 to make it possible to use that installation for pumping. A 4-inch test hole was drilled to a depth of 240 feet under the direction of consulting engineers from Decatur, Ill., on the ground adjoining the water-works and a short distance from the three dug wells which were supplying the city at that time. Water was struck, but not in sufficient quantity to pay to develop it. A second hole was drilled inside an 8-foot dug well at the water-works to a depth of 100 feet, without finding enough water to increase the supply. Other wells were driven in close proximity with similar results.

PUMP BUILDING OF THE MT. PULASKI WATER-WORKS BEFORE THE GROUNDS WERE GRADED AND SEEDED

It was apparent that there was not enough water near the old pumping-station to supply the city's increasing demands, so that city officials decided to go further south and east and try to locate the underground glacial valley which was reputed to be an abundant source. About three-quarters of a mile from town in test holes 4 and 20, a large body of water was struck at a depth of 50 feet, the drill passing through 11 feet of sand and gravel. Hole 20, which was 300 feet east of hole 4, showed 29 feet of water-bearing sand and gravel. After



TEST OF NEW WELL AT MT. PULASKI, SHOWING IT DISCHARGING WATER THROUGH AN 8-INCH PIPE INTO A WEIR-BOX, THE PUMP BEING OPERATED AT HALF-SPEED BY A BELT FROM A TRACTION ENGINE



FAIRBANKS-MORSE 30-HORSE-POWER, VERTICAL, SLIP-RING ELECTRIC MOTOR WHICH OPERATES THE AURORA PUMP

The motors are directly over the wells and connected to the pump by a 2-inch shaft which has water-lubricated bearings located every 6 feet

boring four more holes in that part of the town, engineers and city officials decided that the best supply had been found at this location, and while this site was very undesirable, it was decided to build a new pumping-station, and plans for a pipe line were drawn by Holbrook, Warren & Van Praag of Decatur, Ill.

Holes 4 and 20, which were 8 and 10 inches in diameter respectively, were given a four-day-and-night continuous pumping test by the writer, who was assisted by men from the State Water Survey at Champaign and officials of the State Department of Public Health in Springfield. These wells furnished only 125 gallons of water per minute, and although the quantity was much less than the city desired, it seemed to be better than could be found without going to Salt Creek, 3½ miles north of the town. It was proposed to equip these wells with double-acting plunger pumps of 85 gallons capacity each per minute and connect them with the water-mains on South Spring Street, which would have required the laying of 2,500 feet of new 8-inch cast iron bell-and-spigot pipe.

Delay Advantageous

Work was held up until the summer of 1923 because the owner of the tile yard where the wells would be located could not come to an agreement with the city on the price of the land needed for the pumping-station. It had been the intention when the city began prospecting to drill test holes all around the city, which is situated on a 76-foot elevation. The writer had tried to have these plans carried out, but was unable to secure the necessary authority. Late in the summer of 1923, after a local election, it was decided to call for outside bidders to locate and develop a more adequate water-supply. Four bids were submitted, and the contract was given to the Sickel Water Production Company of Aurora, Ill., which agreed, for a stipulated sum slightly more than the cost of water-mains from the tile yard to connect with the city water-mains, to drill two 12-inch wells under a bonded guarantee that they would supply 250 gallons per minute each or no payment would be required from the city. After the contractors had looked over the ground and consulted the logs and samples of the different test holes sunk, they decided to drill about five blocks from the center of the city and a mile northwest of the tile yard. Drillers began work in November, 1923, on a lot in a closely settled residential district, which the city later purchased.

Two wells were drilled, each 83 feet in depth, passing through 63 feet of coarse water-bearing sand and gravel. When the drills were withdrawn, the water rose to within 18 feet of the surface, where it has remained. These wells, located 27 feet apart in a modern brick building of the bungalow type, were equipped with 18-inch, 4-stage Aurora turbine pumps, set in a 20-inch pit at a depth of 53 feet, with 20 feet of 8-inch suction pipe extending down into a 12-inch screen furnished by the contractors. The wells are located directly under the motors in a 40 x 20-foot room. An I-beam runs the length of the building directly over the building, equipped with a trolley and hoist for pulling the pump, should occasion arise. One pump has a combination head with pulley, so that if at any time the electricity should fail, a tractor can be connected to it with a belt and the pump operated just the same.

These wells were given a 24-hour continuous pumping test in February, 1924, and each well supplied 350 gallons per minute, or 100 gallons

more than the guarantee. Each pump is run by a 30-horse-power electric slip-ring motor. The pumps, motors, automatic controls, starters and casing were a part of the contract price upon which the contractor and the city had agreed. Three hundred and sixty feet of 6-inch water-main was all that was required to connect the pumps with the distribution system, the wells being located almost halfway between streets, with mains leading direct to the 60,000-gallon tank in the public square on the peak of the hill. The pressure-gage at the pumping-station registers 62 pounds when the tank is full, and an equalized-altitude gage located in the office tells the superintendent the number of feet of water in the tank at all times. A master meter on each pump records the number of gallons pumped each day. The city is 100 per cent metered.

The analysis of the water from the new well shows a much softer water than that from the old wells and complies with the U. S. Public Health Service standards of purity. To finance the new water-works, the city issued bonds for $20,000, which were taken by one of the local banks. Not all of this money was spent, and the city has an adequate water-supply.

Method of Drilling Wells

The Sickel Water Production Company has a unique system for drilling the wells. It uses a rotary drill and does not put down any casing until the hole is finished, whether it be 50 or 500 feet deep. During the drilling process a steam force pump forces soft clay down through the center of the drill, which rises and plasters the walls and prevents cave-ins. The hole is kept full of the clay mixture, which flows off the top and back into the clay pit, when it is again pumped back into the well. Should the test hole prove that there is a good body of water-bearing sand and gravel, as at Mt. Pulaski, the 8-inch drill is withdrawn and one which drills a 22-inch hole takes its place and enlarges the 8-inch hole, the same process being followed as in the test drilling. The 22-inch hole is drilled down to the depth to which it is proposed to sink the pump. The drill is then withdrawn, and a 20-inch steel casing, riveted and calked at the joints, is sunk to the bottom of the 22-inch hole, thus making a pit for the pump. Following this, a 17-foot well screen, 12 inches in diameter, is let down into the 20-inch casing until the bottom end, which is open and cone-shaped, rests upon the sand and gravel. A long bucket with a valve in the bottom is then let down inside the screen. The clay is first baled out and this is followed by baling out the sand and gravel. As a bucket of sand is removed, the screen settles down, carrying with it the washed and screened gravel that has been shoveled in around it inside the 20-inch casing. This process is repeated until the screen rests upon an impervious stratum beneath the bed of sand and gravel.

The bottom of the screen is then plugged with wood and cement so that the water must pass through the slots of the screen and the screened gravel that has been shoveled in. Ten feet of blank pipe is screwed into the top end of the screen and sticks up into the center of the 20-inch pit, acting as a suction line for the pump.

Many Municipalities Improve Milk Supplies

AMONG the press clippings received by the New York State Department of Health recently, as reported in its bulletin, *Health News*, for April 27, 1925, items on the adoption and enforcement of local milk ordinances have been conspicuously numerous and interesting. One of the most notable appeared in the *Rome Sentinel*, reporting that a delegation of local milk dealers had appeared before the Common Council requesting the adoption of the model milk ordinance recommended by the State Department of Health and Conference of Mayors. The Council referred the matter to the Commissioner of Public Welfare for investigation.

A conference of health officials with the Common Council of Salamanca on March 31, according to the *Salamanca Republican*, brought out the fact that state and local regulations were not being enforced, and led to the decision that milk dealers would be held responsible for meeting the requirements and that dealers selling milk without permits would be prosecuted.

In Irvington, in which all milk is required to be pasteurized, the health officer has announced, according to the *Tarrytown News*, that he will revoke dealers' permits unless the established standards are met. He is quoted as saying that Grade C milk was being sold as Grade A.

The Board of Health of Cornwall village having adopted an ordinance permitting the sale of milk from tuberculin-tested cattle only, Dr. R. W. Thompson, Health Officer, is urging the Town Board of Cornwall to adopt a similar ordinance. "The milk supply of Cornwall has been raised," says the *Cornwall Local*, from what was at one time termed 'Grade C Rotten' to as fine a supply as is delivered to the homes of any community in the state."

After September 1, says the *Utica Observer*, only milk from tuberculin-tested cattle can be sold in Little Falls. The *Bath Courier* reports that the village Board of Health has recently adopted the model milk ordinance. In Schenectady, says the *Albany Telegram*, the enforcement of the model milk ordinance has been postponed from April 1 to May 1, to permit milk dealers to meet the requirements. In White Plains, where 7,000 of the 8,000 quarts of milk sold daily are pasteurized, the adoption of an ordinance requiring the pasteurization of all milk is being urged.

Forward Steps in Municipal Affairs

Annual Supplements to Cleveland's New Municipal Code to Be Issued

CLEVELAND, OHIO.—This city has recently republished its general ordinance as a codified volume, enacted into a single ordinance. A previous codification was made in 1921, but the adoption of the city manager charter, going into effect in 1924, rendered extensive changes necessary in the administrative provisions of the ordinances, and these were found to ramify so far as to make a complete recodification advisable.

The old Council foresaw the need of a new administrative code at the opening of the new régime, and undertook to establish an Administrative Code Commission to revise the old and to provide new ordinances as the situation should require. Fred Kohler, the last mayor with the veto power, set out to block this project, and succeeded in delaying it for a number of weeks. While the Commission submitted its report on December 31, 1923, it took several weeks longer to get it printed and ready for formal introduction into Council. It was necessary to refer the code to numerous committees, and this circumstance, together with the summer vacation, deferred the final passage of the revised code until late in September, and it was put into effect on October 1, 1924.

Meanwhile, the provisions of the code which were necessary immediately to facilitate administration under the new form of government were introduced and passed as separate ordinances, later to be repealed when incorporated into the code as passed.

In preparing the code it was found that by no means all the general ordinances enacted since the Municipal Code of 1921 had been properly keyed into that code. Some had been passed as amendments to prior ordinances which had been incorporated into the 1921 code, the original ordinance being then appealed. Some had been passed as new ordinances, with no cognizance taken of the existence of a code. The records were carefully searched and such ordinances were properly fitted into the new code. Especial care is being taken to prevent the recurrence of such a situation, by requiring all new ordinances of general nature to be keyed into the new code as passed. It is planned to issue annual supplements, assembling all amendments and new sections in effect at the time of issue.

The Administrative Code Commission employed as its secretary Emmett L. Bennett of Cleveland He not only suggested a great deal of the new matter in the administrative code, and drafted whatever was required, but also undertook the work of checking out the changes previously made, so as to assure the accuracy of the code as finally passed. He also prepared the comprehensive index to the code for its publication in book form.

CLAYTON C. TOWNES,
Mayor.

—For a suggested outline for a model code of municipal ordinances see article on "Codification of Municipal Ordinances," p. 89, The Municipal Index for 1925.

Topeka Codifies Its Ordinances

TOPEKA, KANS.—Municipalities considering the codification of their ordinances may be interested in the volume of Revised Ordinances of the City of Topeka, Kansas, 1925, by E. B. Smith of the Topeka Bar, that has been compiled and published by authority of this city. This compilation is designed to present in convenient form the texts of such general ordinances as must frequently be consulted by city officials and others. It also includes tabulations of many ordinances of less general interest, such as those relating to benchmarks and grades, opening, widening and extending, and vacating streets and alleys, boundaries of sewer districts, width of roadways and parking grounds, etc. These ordinances are referred to merely by number and ordinance book, substance of contents and date of taking effect.

In this volume the ordinances are arranged alphabetically by subject, and have been listed in the table of contents in this order, with the numbers of the chapters, book paragraphs, and pages given in each case. In addition, an unusually full and complete general index, in which references are given to the numbered book paragraphs, listed alphabetically by subject, has been included. When only the number of an ordinance is known, the page upon which it is printed or referred to may be found by means of the numerical index.

Another feature which it is believed will prove to be of interest and value is a table of cases decided by the Supreme Court of Kansas or the Kansas Court of Appeals in which the city of Topeka was a party, or in which its powers and functions were considered.

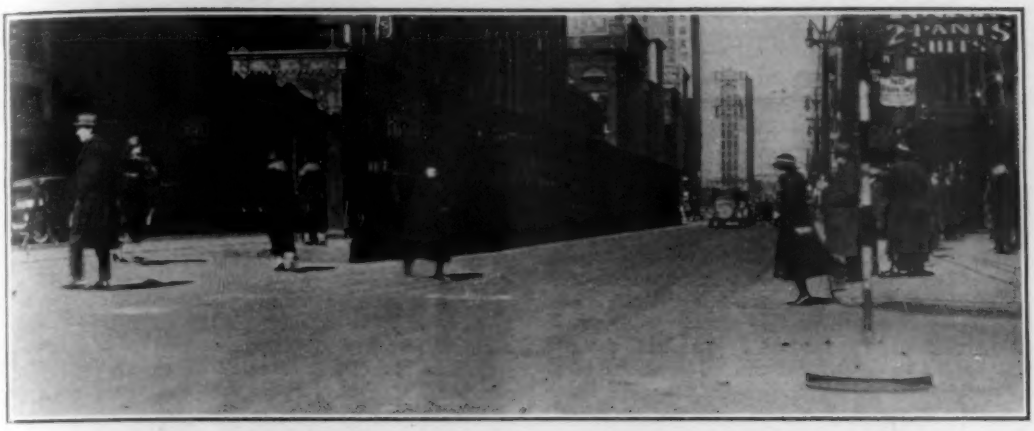
The ordinances relating to buildings, the planning commission, and zoning have been omitted from this compilation, it being the purpose of the Board of Commissioners to have these ordinances printed in a separate volume after further revision.

ETTA M. COVELL,
City Clerk.

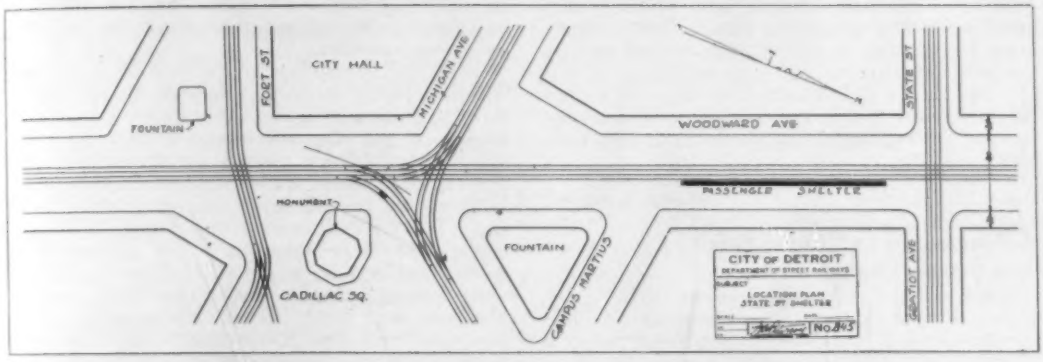
A Traffic Shelter for Safety and Comfort

DETROIT, MICH.—A new departure in accommodations for the public, under modern traffic conditions, has lately been placed in service by the Department of Street Railways, Detroit. Briefly, this consists of erecting a permanent shelter over a safety zone of the raised concrete platform type; thus the shelter takes up no more of the street area than the original safety zone—220 feet long and 7 feet 1¼ inches in width.

The shelter is of structural steel construction, with all columns on the rear or curb side, and the roof supported by cantilever beams from these columns. The rear wall is made up of steel sash glazed with polished wire glass and sheet steel panels. There is no wall on the track side. Provision is made in the roof to take care of rainwater and the structure is electrically lighted. Particular attention was given to the appearance of the shelter, and an ornamental iron treatment was



STATE STREET TRAFFIC SHELTER, DETROIT



designed which effectively relieves the stiff lines of the steel frame.

The structure is located on Woodward Avenue at the intersection with State Street and Gratiot Avenue, one of the busiest corners in the city. It is a heavy loading point for street-car traffic and, in addition, vehicular traffic is very dense during the usual busy hours. Previous to the erection of the shelter there was a motor-bus and jitney stop in this block opposite the southern end of the zone. This has been moved one block to the north, thus freeing the curb of parked vehicles. In using the station, the Department of Street Railways adopted the so-called "Berthing System" to accommodate the two street-car lines in Woodward Avenue. The northern third of the shelter is assigned to the Hamilton Line, which carries the lesser number of riders, while the rest of the shelter is used by the heavily traveled Woodward Line. The operators of the cars are instructed to take on passengers at the designated points only, rather than to attempt to come as near the corner as possible, which had been the case previously. Signs direct the passengers where to expect the cars. This system has worked out very advantageously in the movement of cars, and confusion in the former safety zone, due to car-riders running backward and forward to meet the cars, is eliminated in the shelter.

It has been demonstrated that the people can reach the shelter with no more trouble than they did the safety zone; motor traffic flows past with more smoothness due to the absence of parked vehicles; thus the general effect has been to lessen confusion and expedite traffic in every way.

G. A. PETERSON,
Construction Engineer.

Stockton Votes $3,000,000 for the Development of Deep-Water Facilities

STOCKTON, CALIF.—By a vote of 11,292 to 937, out of a voting strength estimated at 15,500, the citizens of Stockton have voted bonds in the sum of $3,000,000 for the development of deep-water facilities.

The election, held April 21, was noteworthy in several respects. There was no open opposition to the issue; there was actual rivalry among all classes in forwarding the success of the election; and the issue was brought to a successful consummation within five weeks after the initiation of legal procedure.

Stockton is to proceed with the development of its deep-water harbor on lines laid down by the Board of Army Engineers for Rivers and Harbors. Briefly, it is proposed to dredge the San Joaquin River from Suisun Bay to Stockton, 26 feet deep at mean low water and with a 100-foot clearance at the bottom, bringing the river channel direct to Stockton and Mormon channels on the western line of the city.

The costs are to be divided between the city and the Federal Government, the principal expenditures of the city involving the acquirement of harbor facilities. The State Legislature has just

passed a bill carrying an appropriation of $419,000 to assist in the acquirement of rights of way. When completed, free passage will have been provided for large ocean vessels, and ample facilities for their care in harbor.

Sixty years of discussion of the city's ambition for deep water has been brought to successful culmination within twelve months. Late last year, Stockton so successfully presented its claims to the Federal engineers that a favorable recommendation was secured. Likewise, on the convening of the Legislature, additional appropriation was secured, to be followed by an election indicating noteworthy unanimity by the people. The city's contribution for actual dredging is $1,307,500, and is to be met by an equal amount from the Federal Government. The initial bond appropriation is ample to care for all preliminary work on the harbor.

It may be added that, concurrent with this great improvement, the city is about to call for plans for a great restraining dam on the Calaveras River, to impound, control, and utilize waters which carry the menace of flood. Also, expenditures for bridges, a subway, the re-equipment of the fire department, the construction of a city hall and of an auditorium, have been authorized. All this improvement has been planned and thus far met without disturbing the low tax rate heretofore existing.

CHAS. E. ASHBURNER,
City Manager.

A Monument to Public Spirit in a Small Town

BLANCHESTER, OHIO.—In its new High School, dedicated a short time ago, Blanchester, with a population of 1,671, has demonstrated what a public-spirited citizenship can accomplish in a small community. From the standpoint both of architecture and of equipment, this school is one of which a community considerably larger than Blanchester might well be proud. It was erected at a total cost, exclusive of the site, of approximately $100,000. Of this amount, $67,000 was expended for the general building contract; $15,000 for plumbing, and the heating and ventilating systems; and the balance for equipment, a sewage disposal plant, cement walks, grading, architects' fees, etc.

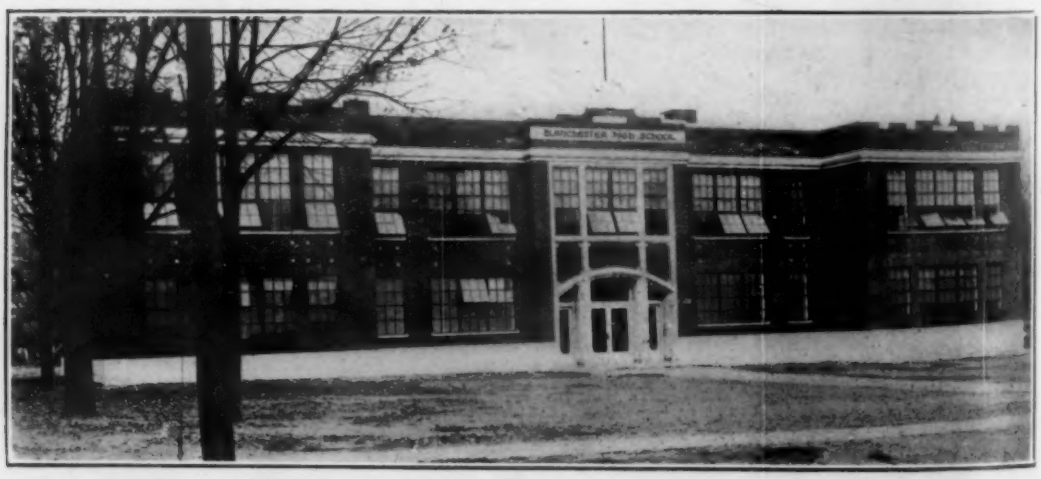
The auditorium, which has a seating capacity of about 650, is particularly well planned. The acoustics of the hall are perfect, and the floor has been sloped sufficiently to afford a good view of the stage from any seat. It has an orchestra pit, marked off by a brass railing and curtains, and a stage measuring 40 x 60 feet extending across the full width of the hall. The stage has been adequately fitted for theatrical performances, with curtains, alternating amber and white footlights, two flood-lights, three color slides, and a cycloramic stage setting. With the scenery and curtains removed, the stage serves as a gymnasium and basket-ball court. Underneath the stage are lockers, shower-baths and dressing-rooms.

The heating system that has been installed is of a modern type, and when put to the test during the extreme cold weather of last winter, it proved most satisfactory. The ventilating system is also of an up-to-date type, and effects a complete change of air throughout the building every ten minutes.

After the completion of the new High School, the Board of Education remodeled the old school building for use by the elementary grades and vocational and domestic science classes, and also purchased additional ground for an athletic field for the high school pupils. These improvements involved an expenditure of approximately $11,000. The domestic science department, which occupies two large rooms and can accommodate twenty students at a time, has been well fitted with cooking utensils, electric hot-plates, sewing machines, etc. Some valuable equipment has been purchased for the laboratory, and tools and twelve new work-benches have been supplied to the manual training department.

HOWARD M. WILSON,
Manager, Civic Affairs Department, Cincinnati Chamber of Commerce.

[EDITORIAL NOTE.—Civic organizations interested in the public schools will find much of value in an article on "Recent Progress in Public Education," by John J. Tigert, U. S. Commissioner of Education, in the 1925 MUNICIPAL INDEX.]



NEW HIGH SCHOOL BUILDING, BLANCHESTER, OHIO

Effective System of Traffic Control in Syracuse

By John H. Walrath
Mayor of Syracuse, N. Y.

DURING the present administration of the city government, the time seemed opportune for the installation of an adequate system for the control of automobile and pedestrian traffic in the congested district of Syracuse. With this in mind, traffic signal experts were called in consultation with the city officials. The plans finally agreed upon called for the automatic and simultaneous, or synchronized, control of thirty-two intersections located as shown on the accompanying map. Two traffic control units which have been in operation for some time and are manually operated at corners with special traffic problems, were not made a part of the new system.

Signals

Conforming to standard practice, illuminated signals of three colors are used, green for "Go," red for "Stop," and amber for "Caution," the words being printed in large letters on the signal lenses. When traffic is to proceed north and south, the signals controlling the traffic on those streets indicate green, with all east and west red. The signals remain thus for thirty-five seconds. Next, for a period of five seconds the amber light shows on all signals, with a bell ringing at every corner. The five-second period with amber signal is to allow the intersections to clear, and other traffic is not supposed to move until the signal has changed to "Go." Following this, all north-and-south streets show red and all east-and-west green for a twenty-five-second interval, followed by another five-second period with all signals amber and bells ringing. This completes the normal cycle.

A switch is provided at each intersection, so that all signals at the intersection may be thrown red by an officer at that point, if emergency demands such action.

Syracuse has a very vexing grade-crossing

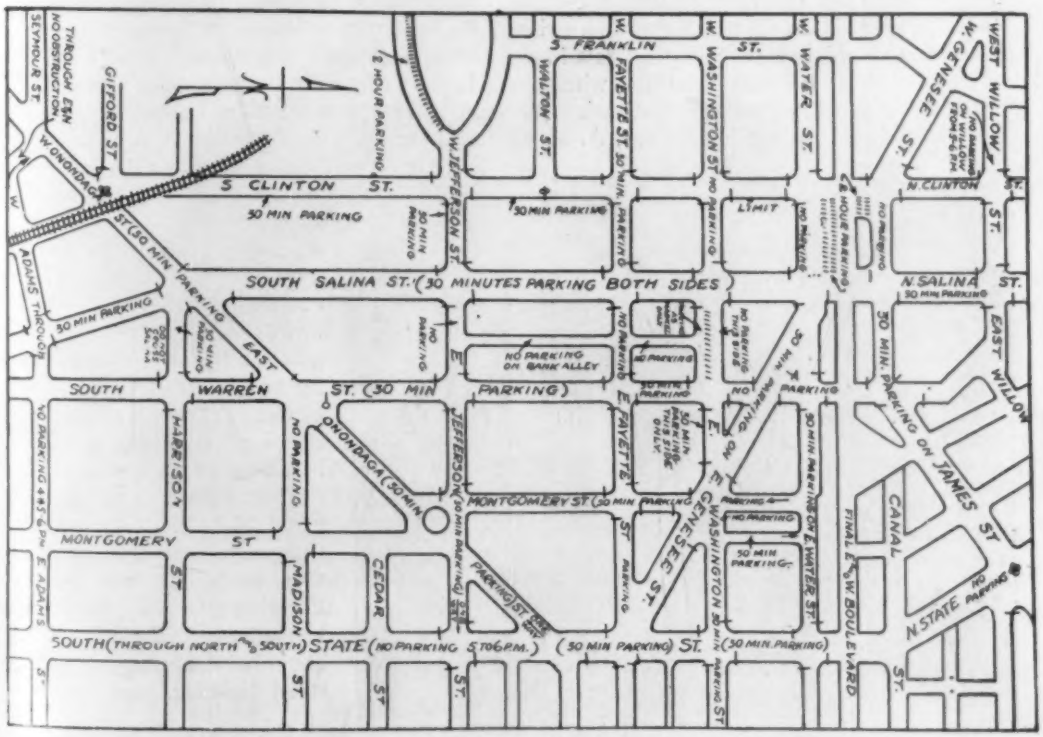


FIG. 1. MAP OF SYRACUSE SYSTEM OF TRAFFIC CONTROL

FIG. 2. HORIZONTAL MOUNTING OF SYRACUSE TRAFFIC SIGNALS, WITH "NO LEFT TURN" SIGNS

problem where the New York Central main lines cross all the north-and-south streets in the congested area. At these crossings, in addition to the switch referred to above, another switch is installed whereby the flagman at each crossing sets his signals green east and west, and red north and south, while the train is passing.

In addition, the system is so arranged that in case of fire the operator in the fire-alarm telegraph office in the City Hall throws a switch which sets every signal red and causes all bells to ring. This is the only condition when the bells ring with any signal light but amber.

After 11:00 P. M. and before 7:00 A. M. all signals show amber without the bells' ringing.

At intersections where left-hand turns are prohibited, enamel signs stating this are suspended immediately below the signals.

Types

The signal used is the three-color single-faced type with four at each intersection, usually placed on the far side of the cross-street, as indicated in Fig. 1. These units are mounted on cast iron poles of the same design as the street-lighting standards. Where mounted horizontally over the pavement, a clearance of 14½ feet is allowed. Where it is necessary to have the signal lower, the unit is mounted vertically and does not extend beyond the curb. The automobile driver is governed by the signal nearest him and also by the line of signals on successive intersections in the distance. In approaching the congested area the line of colored lights is visible for many blocks. Photographs of both styles of mounting are shown herewith (Figs. 2 and 3).

The signals are manufactured by the Crouse-Hinds Company, and the installation was made by the Syracuse Lighting Company, Inc., on an arrangement similar to that used in financing ornamental street lighting.

FIG. 3. VERTICAL AND HORIZONTAL MOUNTINGS OF TRAFFIC SIGNALS IN SYRACUSE

Control

The system is made up of

five districts, one for each north-and-south street. Each district has its own contactor panel, placed in a cast iron cabinet on the sidewalk at the curb near the geometrical center of the district. These contactors are remote-controlled, the impulse coming from a control tower which is located at the most advantageous point in the system (Fig 4). An officer is stationed in the tower at all times when the system is in operation. The system is operated automatically, but in case of trouble, by the throw of a transfer switch, the officer may use the manual control switch and operate the system until repairs or adjustments are made in the automatic switch.

This system has been operative since January 15 last and has already proved itself to be so valuable that additions and extensions are being advocated. It is of inestimable value to the pedestrian as well as the motorist, as it assures the former of safe passage across the street with the signals set "Go." Excellent cooperation has been received from both motorists and pedestrians. It is estimated that at least 95 per cent of the former and 90 per cent of the latter now obey the signals. The system is proving its worth to the city government also in releasing a number of officers for duty elsewhere who were engaged in the control of traffic at the intersections now controlled automatically.

FIG. 4. TRAFFIC CONTROL TOWER, SYRACUSE

The speeding up of traffic, lessening of accidents, and relieving of congestion are all factors that a modern city must give attention to. The system is an ornament to the city, and Syracuse feels that it is a sign of civic progress.

City Planners from Many Lands at the White House

AFTER the adjournment of the International Town, City and Regional Planning Conference, held in New York April 20-25, at which 24 countries were represented, a group of the foreign and American delegates visited Washington for the Pan-American Conference on Capital Cities, held under the auspices of the American Civic Association. The delegates were received at the White House on April 28 by President and Mrs. Coolidge. At Mrs. Coolidge's right in the accompanying picture is Ebenezer Howard, father of the garden city movement and President of the International Federation for Town and Country Planning and Garden Cities. Behind Mr. Howard at his right is John Nolen, of Cambridge, Mass., who was elected President of the National Conference on City Planning at the meeting in New York City.

"The FUTURE belongs to the city which PLANS for it."

The Advantages of Metropolitan Water-Supply Districts

A Discussion Based on the Operations of the Baltimore County Metropolitan District

By V. Bernard Siems
Water Engineer, City of Baltimore, Md.

NEW ENGLAND possesses in the Metropolitan District of Massachusetts an excellent example of the benefits that can be obtained from suburban districts through the consolidation of the control of water and sewerage utilities. From the standpoint of water-supply, the establishment of metropolitan districts insures the development of resources to the best advantage, adequate service, and the control of operations by professional engineers who are not limited in working for the interest of the consumers by the necessity of showing profit, as is the case in the privately owned and operated water-works.

Baltimore Urges Creation of District

There are in Maryland four such Metropolitan Sanitary Districts. The Baltimore County Metropolitan District, recently created, is worthy of notice, as its nature is somewhat unique. In fact, it may be said that this district was created at the instigation of the city of Baltimore. While this may seem unusual, since the water-supply of the Baltimore County Metropolitan District is obtained from that of Baltimore City, Baltimore's interest can be better understood when I recite the experience of the city at the time of the last annexation in 1918.

The act of the Maryland Legislature "to extend the limits of Baltimore City by including therein parts of Baltimore County and Anne Arundel County," provided for the acquisition by purchase and condemnation of any water-works within the territory annexed by this act to Baltimore City, which might be needed for any public purpose.

It so happened that there were nine private water companies operating in this territory, and the part of Baltimore County contiguous to the city, supplying from 70,000 to 75,000 people with approximately 7,000,000 gallons of water per day. The systems of the private water companies had not been designed with regard to the future development of Baltimore City's water-supply, but as individual units to supply segregated areas; the water-mains of these systems were neither coordinated with the city system nor with those of each other, and were not of a size sufficient to guarantee adequate fire protection; in short, these systems were not of the standard maintained by the Baltimore City Water Department throughout its system.

Consequently, the acquisition of these companies necessitated not only a very large capital outlay for their purchase, but also huge capital expenditures to rehabilitate inadequate systems and construct coordinating feeders and supply mains.

The subsequent $25,000,000 water loan of 1920 was expended in part for the purchase of the private water companies, but the money for this purpose was not economically expended on account both of inflated prices and of the necessity for the extensive scrapping and rebuilding of these plants.

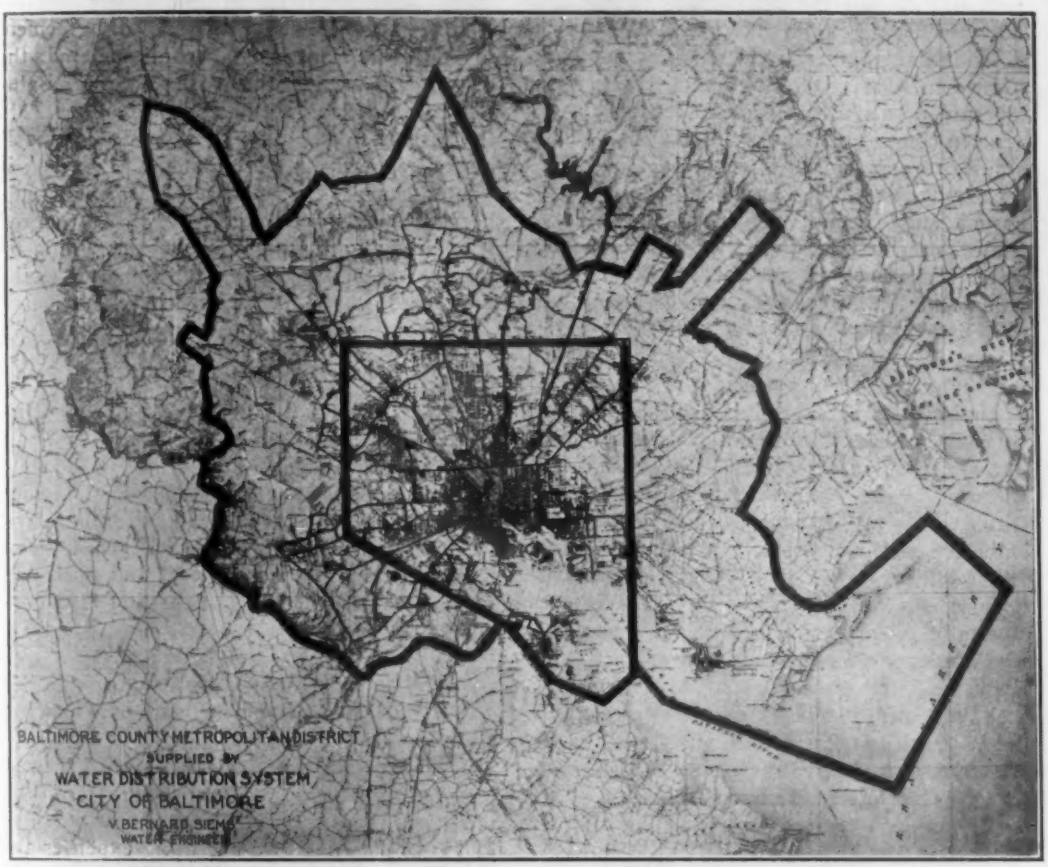
To prevent a repetition of similar conditions when the next extension of the city limits occurs, Baltimore favored the creation of a Metropolitan District contiguous to the city, and was successful in seeing an act creating this District passed by the last Maryland Legislature.

Present extensions in the county under the act are financed by residents of the county. In the event of another annexation, these extensions will become the property of the city of Baltimore, which will then take over all outstanding bonds with no expensive purchases of private water companies to consider and to retard action.

Toledo has recently passed an ordinance which provides that the city may take over water lines in new annexations without cost. The ordinance further provides that the city shall not furnish water to any territory outside of the city limits unless the persons controlling this territory agree that, in the event of annexation, the city may take over the water lines without cost. Other cities follow similar procedure, Rochester, N. Y., being the only city cited in the *Toledo City Journal* as making a practice of reimbursing subdividers for water-mains in newly annexed territory.

Our case is somewhat similar to that of Columbus, in that their County Sanitary and Engineering Department installs the water and sewerage systems. Baltimore City differs radically from Columbus, as indeed from most American municipalities, in that it is entirely separate and distinct from Baltimore County, whereas Columbus is a political unit and part of a county.

The county is relieved of the cost of securing, collecting, and purifying works, with inevitable delays and heavy initial expense. This is especially important in view of the increasing trend of population to move to suburban sites in the county, adjacent to the city line. Baltimore City has practically a monopoly on the Gunpowder Falls, the only stream capable of providing large quantities of water which can be made potable at reasonable cost. The county would be compelled to construct comparatively long conduits, or to drill wells to supply its needs. While the county is still free to do so for areas so remote from the city that feeder mains would be excessively costly, it is the intent of the bill that the county secure water from the city whenever possible.



Provisions for Extension and Administration of District

The act which creates "a Metropolitan District in Baltimore County contiguous to Baltimore City" outlines in detail the boundaries of the District. It makes extension easy, however, in that it provides for the inclusion of any other area, contiguous to the present district, upon the application of three-fifths of the registered voters of that area. This application must be approved by the authorities of both Baltimore City and Baltimore County.

The administration of this district is placed in the hands of the County Commissioners of Baltimore County, who are given broad powers. The act provides for water-supply, sewerage systems, and storm-water drains in the District. The Commissioners may purchase or condemn existing works, for their use, in these three utilities. They are authorized to secure engineering and clerical assistance, and may enter into agreements with the city and with the bordering Anne Arundel County for the use of the sewers and disposal works of these subdivisions of the state. The power of eminent domain enjoyed by the Commissioners extends

to every part of the state excepting only the properties and privileges of the city of Baltimore and the property of the Bethlehem Steel Company at Sparrows Point. They may cause surveys, studies and plans to be made for service, may issue bonds on the faith and credit of Baltimore County, and fix assessments on properties. The Commissioners shall annually determine the amount necessary to pay interest and sinking-fund obligations, and shall levy annually against the subdistricts of the District a sufficient tax to meet them.

No individual, firm or community may hereafter construct water, sewerage or storm-water systems, or make extensions, except upon the written consent of the Commissioners. Public service corporations must submit detailed plans of extensions to the Commissioners for approval. The Commissioners, acting through the State Board of Health, may condemn unsafe water and sewerage systems of private individuals and may compel them to connect to the District systems.

The Metropolitan District is subdivided, each subdivision being considered a unit. The Commissioners prepare plans for the extension of water-mains into each subdivision, with laterals and house services. These plans are approved by the Water Engineer of Baltimore City, who thus safeguards the interests of both city and county, in that adequate mains are provided as in the standardized distribution system of Baltimore City. This insures especially adequate fire protection. The Commissioners may, at the discretion of the Water Engineer, purchase materials and contract for such portions of the actual construction as the Water Engineer may direct. In all cases, however, it is clearly the purpose of the act that the City Water Department shall approve the design but execute all construction work at the cost of the District.

City Supplies Water

The operation and maintenance of the water system are distinctly the duty of the Water Department of Baltimore City, no provision being made in the bill for operating and maintenance forces under the jurisdiction of the County Commissioners.

The Baltimore County Metropolitan District is the fourth district created in Maryland. The Washington Suburban Sanitary District embraces territory contiguous to the District of Columbia. The Anne Arundel County District embraces scattered development in that county. The Salisbury District includes the city of Salisbury and adjacent rural territory. A proposed district in western Maryland will care for the collective sanitary needs of mining towns in that section. The Baltimore County Metropolitan District is unique, I believe, in that it is supplied with water by an independent municipality which is almost surrounded by the District, and whose source of water-supply lies largely in the county controlling the District. The municipality lays water-mains and laterals, and installs house connections, being reimbursed for all costs by the District, such costs being received by the Public Service Commission of Maryland if disagreement arises. The consumers are all metered, the rates being fixed by the Water Board of Baltimore City, subject to the approval of the Public Service Commission of Maryland.

For comparision, note that the Metropolitan Water Supply Commission of Massachusetts, created in 1893, collected water and delivered it to the limits of the municipalities within its area. It constructed only impounding works and feeder conduits, leaving the extension of feeders, operation and maintenance within the borders of municipalities to the municipalities concerned.

The Washington Suburban Sanitary District, and the smaller Districts of Anne Arundel County and Salisbury, all in the state of Maryland, operate as complete units, under the State Board of Health, in collecting, purifying and distributing water. Each District maintains engineering, clerical and operating forces, subject to rulings of the State Employment Commission.

Methods of Financing

A comparison of the methods of financing the improvements is here in order:

The Massachusetts District, constructing impounding works and main lines, pays for this work through bond issues. Interest, sinking-fund payments and operating expenses are prorated against the municipalities concerned. These charges may be reviewed by the Supreme Court of Massachusetts, in the event of a disagreement.

The Washington Suburban Sanitary District pays for collecting works and feeder mains through bonds, which, in turn, are met by a direct tax levy on the District. The cost of laterals is not through benefit assessments on the abutting property owners. House services are direct charges against the owners concerned. All supplies are metered, the rates being fixed by the Commission, subject to the review of the Public Service Commission of Maryland.

In the Baltimore County Metropolitan District the taxable property is classed as agri-

cultural, small acreage, industrial or business, and subdivision property. Benefit assessments are on the front-foot basis, except that agricultural property is not charged until service connections are made. Charges are then based on the front foot, except that this property may not be charged for a greater length than 150 feet. Main extensions, both feeder and laterals, are made by the city of Baltimore and charged against funds set up by the County Commissioners, as noted above under bond issues.

Each subdivision of the Baltimore County Metropolitan District is taxed for feeder mains traversing its area, through bond issues prorated to each subdistrict. Interest and sinking-fund payments are met by a general tax levy on the subdivision concerned. Laterals are charged as benefit assessments against abutting property owners, and house service connections are charged directly against owners. All these taxes and charges are collected by the County Commissioners, who reimburse the city of Baltimore for the cost of the work done. Operating and maintenance costs are borne by the city of Baltimore and are reflected in the rates charged consumers.

We thus see that, in so far as the operation of the water system is concerned, the Baltimore City Water Department exercises full control as in the city, and when the territory supplied is finally brought within the limits of the city, there will be no change experienced in its operation. It is our plan to anticipate the demands and exigencies of the future, and the creation of this District, controlled by the city, is a distinct advance.

Further, the creation of this District will benefit dwellers in the area by an advance in health and well-being. Many of these dwellers being employed by industries and establishments within the city, protection is thus extended, in a measure, to city dwellers who are in daily contact with them. As population in the District is rapidly increasing, wells and cesspools are approaching the stage where not only is pollution probable, but many water-supplies are already dangerous.

ACKNOWLEDGEMENT.—From a paper read before the New England Water Works Association.

"Help to Prevent Drownings"

THAT is the slogan which will be broadcast throughout the country this summer by the National Safety Council in a comprehensive effort to reduce the toll of lives in accidental drownings.

Approximately 6,500 persons were drowned in continental United States last year, the Council estimates. Modern educational methods and publicity on the subject have reduced the annual toll from 8,800, the number drowned in 1911. A large part of the credit for this reduction is due the American Red Cross, which has promoted life-saving activities of various sorts in communities large and small. This summer, the National Safety Council will add the organized effort of 60 large cities having a total population in excess of 30,000,000 which have affiliated Community Safety Councils.

The safety councils of these cities will extend the campaign into the public and parochial schools. into the homes and into the industries. Swimming posters will be displayed the country over in an effort to interest people in learning how to swim. The Prone Pressure Method of resuscitation, recognized as the most efficient system of restoring breathing in the apparently drowned, will be taught, along with ways and means of rescuing helpless persons from lakes and rivers. Thirty of the country's largest radio stations will broadcast talks on the prevention of drownings.

Adaptation of National Safety Council's 1925 Swimming Poster

FOR COPIES OF THIS POSTER, APPLICATION SHOULD BE MADE TO THE NATIONAL SAFETY COUNCIL, 168 NORTH MICHIGAN AVENUE, CHICAGO, ILL.

Hints to Swimmers

Don't swim if you have heart trouble.

Never go in swimming alone.

Don't swim if overheated or tired.

Don't swim on a full stomach. Wait at least two hours after eating.

Dive only where you have accurate knowledge of the depth of the water.

Don't swim until exhausted. Rest on your back and then swim ashore.

Don't struggle if caught in a swift current or undertow. The force of the current will bring you to the surface; then work in toward shore.

Learn Red Cross life-saving and resuscitation methods. Be capable of saving others as well as yourself.

Increased Water-Supply for Bellingham, Washington

Lake Whatcom Adds 30,000,000 Gallons Daily to Available Supply

THE water-supply of Bellingham, Wash., is now being increased from 13,000,000 gallons daily to 43,000,000 gallons daily, as the present supply is inadequate for the growing community. Lake Whatcom, a body of water 12 miles long, and averaging a mile in width and a depth of 750 feet in the lower basin at a level of 317 feet above sea level, is to be used as a reservoir. This lake is fed by subterranean springs. The present intake is in 92 feet of water and it is believed that the lake can supply up to 200,000,000 gallons daily if necessary.

The enlargement of the present system will give very nearly perfect circulation in the city and eliminate dead ends and will afford additional fire protection with practically uniform pressure throughout the system. The main supply line comes in on a gradual grade with no peaks or siphons in the line.

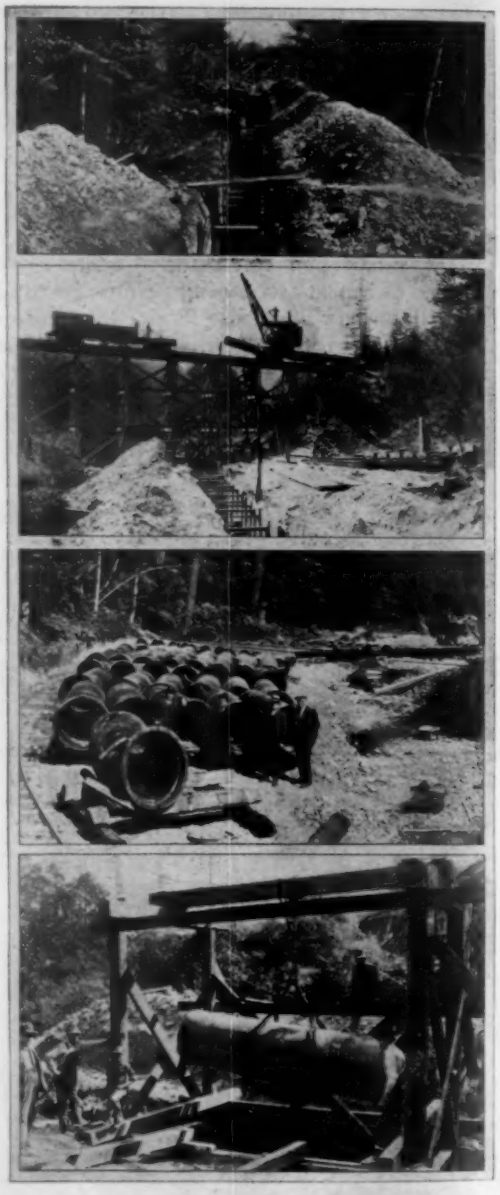
The Utah-Idaho Sugar Beet Corporation has recently erected a $1,500,000 plant at Bellingham, making necessary further additions to the water distribution system, amounting to about $275,000. This new corporation will use about 3,500,000 gallons per day. The additions to the distribution system not only supply the new demand, but also give better service through the manufacturing district of the water-front.

General improvements in Bellingham are going ahead with increased activity, there being a number of large buildings contemplated, ranging from $100,000 to $500,000 each. It is interesting to note that Bellingham has practically no winter, so that small buildings, such as bungalows, cottages and other types of residential structures built of wood, are constructed the year round.

The accompanying illustrations furnished through the courtesy of Charles A. McLennan, City Comptroller, Bellingham, Wash., show some interesting construction points and a view of the storage yard of the 36-inch cast iron pipe.

WATER-SUPPLY STATISTICS

Valuable information and helpful comparisons can be found in the statistics now being published in The American City. See pages 665 to 677 of this issue.



SCENES DURING THE EXTENSION OF THE WATER-SUPPLY TO TAKE CARE OF THE EXPANSION OF BELLINGHAM, WASH.

Top—A section of trench 15 feet deep, showing spoil and trench bracing. Upper center—Unloading pipe from freight cars on trestles over the trench. Lower center—Group of city officials at store yards inspecting 36-inch cast iron pipe. Bottom—Lowering 36-inch pipe into the trench at the end of a 630-foot tunnel

Bituminous Macadam Road Construction

By A. O. Hastings
District Engineer, Indiana State Highway Commission

IF the present road has a good gravel or stone base that is holding up very well, a bituminous macadam top course is a very economical pavement to use. If it is a new grade, there is a question if some other types of pavement would not be as economical. One of the greatest economic points in laying a bituminous macadam pavement is the salvaging of the old base. A well-compacted gravel or stone surface that has been hammered by heavy traffic for a period of years has considerable value, and that value may be conserved by laying a bituminous macadam top course on it.

Grading

Let us consider first the grading. By use of a grader, wheel-scoops, drag-scoops or wagons, the berms, shoulders and ditches should be brought to the proper cross-section and in conformity to the base grade, taking care of the drainage as necessary. Unlike many other types of pavement, the shoulders on a bituminous macadam road should be built prior to the laying of the pavement. Many bituminous macadam roads have been built with but little berm. Much better results could have been secured had there been a good berm built before the pavement.

A good cross-section for an 18-foot pavement is a 2-inch crown in the pavement proper, with berms 5 to 6 feet wide sloping ½-inch per foot, and with a flat slope of approximately 4 to 1 into the ditch. The old base should be reinforced and leveled up with a water-bound macadam course, or at least patched with water-bound patches so that the foundation grade will conform very closely to the finished crown and grade and to sufficient depth to hold up the loads to which travel will subject it. Much care should be used in leveling up the old base, as much better results will be secured in the finished surface if the top course is the same thickness at all places. The specification for laying a water-bound course to level up old base should be about as rigid as if the road was to be left a water-bound surface.

Economy the Watchword

Very popular at present, and in line with the pledge of our Nation's Chief Executive and the Governor of the state of Indiana, also the principle of our State Highway Commission, is — Economy: economy in the laying out of the road system; economy in the selection of the type of surface to be built; and economy in the construction and maintenance of the same.

In selecting the type of pavement to be laid in a certain section of road, careful study should be given to the amount and kind of travel going over this road; also to what it will probably have to carry within a few years. Careful study should be made of the condition of the subsoil and the old base.

Specification for Water-bound Macadam Course

This course shall consist of a one-course water-bound limestone slag or crushed boulders of a depth indicated on the plans or in the estimate. This depth should be chosen after careful study of the old base, constructed in accordance with these specifications on the base course, which shall be trued up where necessary with water-bound patches, to a uniform grade and crown before the top course is placed thereon.

The *coarse aggregate* for this course shall consist of No. 1 (3½-inch to 2½-inch) or No. 2 (2½-inch to 1½-inch) size, specified according to thickness of patch or course.

(A) *Crushed stone* shall consist of angular fragments of tough, durable crushed limestone, trap rock, or boulders, and have a French coefficient of wear of not less than 7. It shall be free from thin and elongated pieces. If it is produced from crushed boulders, not more than ¼ the surface area shall consist of the original smooth surface of the boulder.

(B) *Slag.*—The screenings used in filling this course shall consist of crushed limestone or slag meeting the above specification except as to size. No. 7 (1½-inch to 0) size screenings shall be used if of slag or limestone with a French coefficient of wear of more than 9. No. 5 (¾-inch to 0) screenings shall be used if of limestone with a French coefficient of wear of 9 or less.

No coarse aggregate shall be placed until the screenings for filling same have been neatly stored in piles along the side of the highway.

The coarse aggregate shall be spread on the base to such thickness as will produce the completed depth called for. Side forms of the proper size should be used to fix the depth of loose material and assist in spreading the same to a uniform surface. In spreading, care must be taken to preserve the grade and crown, also to prevent a wavy, irregular surface. After the stone is spread on the base, it should be harrowed, to aid in producing a uniform and even surface. Any thin, flat, elongated or oversized stone that appear on the surface at any time during the process of constructing should be broken up or removed therefrom. Special care should be taken to have a uniform material in the surface if we shall expect a smooth and uniform finished base.

All patches or areas of fine or undersized materials appearing in this course should be removed and replaced with suitable material before final filling and water binding.

Rolling.—The coarse aggregate should be rolled with a self-propelled three-wheel roller weighing not less than 10 tons. The rolling should begin with the outside drive wheel covering at least equal parts of metal and shoulders, and if the shoulder is sufficiently strong and conformably built it is well to have even more of the roller wheel

out on the shoulder the first time through. The roller should be run forward and backward along the edge of the metal until the shoulder and the metal are firmly bound together. The rolling should then progress gradually towards the center of the road, lapping about 2/3 width of the rear roller wheel, until the entire course has been thoroughly keyed and the interstices of the metal reduced to a minimum and all settlement in the stone has ceased. Should there be any low places develop in the surface during the rolling the stone shall be loosened and enough coarse aggregate added to make a smooth and uniform finished surface.

After the dry rolling has been completed as described above, screenings should be applied gradually over the surface during the finishing process of dry rolling, in such an amount as will completely fill the interstices. The screenings should not be dumped on the surface of the stone, but should be cast thinly with spreading motion of the shovel from piles at the roadside. The rolling should continue while the screenings are being spread, so that the jarring effect of the roller will cause them to settle to the bottom. Care should be exercised not to apply the screenings too fast and choke the stone, but the large stone should be kept in sight at all times. Continue to add screenings until all voids are filled, the *direct bearing of the roller still on the coarse aggregate.*

Immediately after the voids of a section of the macadam have been filled with screening as above described, the macadam should be sprinkled until saturated, the sprinkler being followed by the roller. More screenings should be added if necessary. The sprinkling, sweeping and filling should continue until a grout has been formed of the screenings and water that will fill all of the voids and form a wave of grout before the wheels of the roller. The macadam should be kept wet at least 24 hours before the final rolling and it should be puddled as many times as it is necessary to procure satisfactory results. When a section has been thoroughly filled and grouted as described above, such section should be allowed to dry out, after which it is ready for the application of the bituminous macadam course.

The approximate cost of this course varies according to the amount of reinforcement necessary on the old base, but, striking an average from the cost of state jobs coming under my supervision, will average approximately 50 cents per square yard, or approximately $5,200 per mile 18 feet wide.

After the base has been properly reinforced and leveled up with the water-bound macadam, we shall proceed with the laying of the top course of bituminous macadam. This course should be about 3 inches in thickness when thoroughly compacted.

Inspection of Berms

At this time the berms should be carefully graded, and any irregularities leveled off, so that when rolling is started on the top course with half of the roller wheel running out on the berm, the earth forming the berm will compact to a true grade and just level with the grade of the edge of the stone in the bituminous macadam course. Should there be high and low places in the berms, the irregularities will follow the rolling as it progresses towards the center of the road, and a wavy, irregular surface will be produced.

Berm boards should be used in spreading the coarse aggregate. Very handy berm boards for a 3-inch compacted course are 2 x 4-inch set on edge, lined and leveled with the proposed line and grade, the coarse aggregate being dumped and spread to crown and grade and checked up by use of a crown board resting on the 2 x 4. The coarse aggregate may be dumped on the surface and spread by hand, or a rough spread made by use of spreader boxes. Very careful spreading of the coarse aggregate is necessary if a smooth surface is to be produced.

When the coarse stone has been carefully spread, it should be rolled in the same manner as described for water-bound macadam, beginning with one-half of one roller wheel on the berm and progressing towards the center of the road until the coarse stone is thoroughly keyed up but not rolled enough to powder or crush much of the stone.

The coarse aggregate should consist of crushed stone or slag all passing a 3½-inch opening when the per cent of wear is less than 4½, and a 4-inch circular opening when the per cent of wear is 4½ or more. Not over 25 per cent should pass a 2-inch opening; 6 per cent a 1½-inch opening; and 2 per cent a 1-inch opening.

Application of First Coat of Binder

When the coarse aggregate has been keyed up as above, we are ready for the application of the first coat of bituminous material, Indiana state highway specifications for Tar TP-6 or Asphalt A-2. The bituminous material should be applied to the aggregate when it is dry and when the temperature is above 45 degrees F., and when the lowest temperature within the preceding 8 hours has been above 32 degrees F. Care should be exercised that the coarse aggregate is disturbed as little as possible by the application of the bituminous material. The bituminous material should be uniformly applied at the rate of 1¾-gallon per square yard and at a pressure of not less than 25 pounds per square inch and by means of an approved pressure distributor. The distributor should be self-propelled and have a manifold with a horizontal shift of not less than 10 inches and should be equipped with wide tires to disturb the stone as little as possible. Hand pouring pots or nozzles should not be used except where special conditions would make it impracticable to use the distributor. The bituminous material should be heated by a suitable appliance so designed as to admit of even heating of the entire mass with an efficient positive control of the heat at all times. Care should be taken that bituminous material is not heated beyond the highest permitted temperature specified, either before or during the application.

The coarse covering should have been placed

in neat piles along the berm prior to the spreading of the coarse stone. Coarse covering should meet the specifications required for coarse aggregate except as to size. The coarse covering should all pass a 1½-inch circular opening with not over 5 per cent retained on a 1¼-inch screen, 70 to 100 per cent should be retained on a ¾-inch screen, and not over 15 per cent allowable passing a ½-inch opening.

Immediately after the bituminous material is applied, there should be evenly spread over the surface just sufficient coarse covering material to prevent any bituminous material from sticking to the wheels of the roller (approximately 1 cubic yard to 125 square yards of surface). The road should then be rolled thoroughly before the bituminous material hardens enough to prevent the covering material from readily being incorporated with it. Should it be cool, the rolling must progress fast; if it is extremely warm weather, it is sometimes necessary to wait and allow the bituminous material to cool somewhat before rolling. As the rolling progresses, more covering should be added and broomed into the voids, care being taken not to put on an excess of covering at this point. The rolling should continue until a solid, compact, and smooth surface results, conforming to the cross-section on the plans. Should any dips or deformations show up during this rolling, the coarse aggregate should be loosened and more stone and bituminous material added, so that when rolled it will produce a smooth surface.

When sufficient rolling has been done and the voids are fairly well filled with covering stone, the first seal coat of heavy bituminous material should be applied, consisting of about ¾-gallon per square yard of surface, after which the fine covering is spread evenly over the bituminous material in a thin layer just sufficient to keep the bituminous material from sticking to the roller wheels. Then the road should be *thoroughly* rolled. At this point in the construction of a bituminous macadam road I do not think it would be possible to roll too much. Fine covering should be broomed into the voids until the voids are very well filled. At this time the second seal or surface treatment should be applied, consisting of a lighter bituminous material, Indiana state highway specifications for Asphalt OH-2 or Tar TM, at the rate of about 0.3 gallons per square yard of surface. After applying the final seal coat of bituminous material, fine covering should be applied, and if asphalt is used, it should be rolled; if Tar TM is used, the surface should be dragged, as explained for surface treatment of Tar TM.

By conserving the old base, a good pavement may be laid, as described above, at a very reasonable cost.

Pointers

Just a few points to be watched carefully in the above-described method that will materially help in securing better results:

See to it that the berm compacts smooth and true to grade as the rolling starts. After the first application of bituminous material, do not apply too much coarse covering, but apply just barely enough to get over it without the roller wheels' sticking to the bituminous material.

Roll until the coarse stone is thoroughly compacted, and feed in coarse covering as needed; do not choke it.

After the second application of bituminous material, apply only enough fine covering to get the roller over it without picking up, and roll thoroughly before additional fine covering is added. Fill the voids, but do not choke it.

At all times during the process of construction of both the water binding and the bituminous macadam top course, keep the coarse stone visible on the surface of the road.

Keep the cover stone uniformly applied; if for any reason it is applied thick and thin, it should be thoroughly broomed before rolling. A bunch of screenings will cause a depression in the road, for when the roller hits a wad of screenings the coarse stone is mashed down, and when traffic hits the road, the wad of fine stone is brushed off and a dip in the surface results.

Emphasis should be given to the amount of rolling. Too much rolling cannot be done after the first seal coat is applied and also after the surface treatment, should asphalt be used.

Some roads have been built without enough rolling at the proper time, and costly maintenance follows.

As to the cost of construction of an 18-foot pavement of compacted bituminous macadam, the price paid for pavement laid between Chester and Fountain City, Wayne County, was 90 cents per square yard. A pavement laid on the National Road east and west of Richmond, which used some additional stone to level up old base, which was already a surface-treated macadam, cost $1.07 per square yard. A pavement laid between Muncie and Selma cost about 85 cents per square yard.

The foregoing will average from $9,000 to $11,000 per mile for an 18-foot surface, varying mainly as to the cost of the aggregate used. Adding the expense of reinforcing the old base with water-bound macadam to the cost of laying a bituminous macadam top course makes $15,000 to $16,000 per mile of completed surface.

ACKNOWLEDGMENT.—From a paper read at the 1925 Purdue University Road School.

A System of Adequate Highways for the Chicago Region

REALIZING that the manner in which the entire Chicago region will develop during the coming years is almost wholly dependent upon transportation, the Chicago Regional Planning Association last year made a special study of the highway traffic problem. Maps were prepared for the region, showing existing highways, those now paved, proposed pavement on existing highways, proposed pavement on new highways, and pavements to be widened. These maps, of course, show the conditions and recommendations in much greater detail than in the Association's general sketch map of the region, here reproduced.

In reply to an inquiry from THE AMERICAN CITY as to progress already made in carrying out the plans shown in the Association's booklet, "Highways in the Region of Chicago," Secretary Robert Kingery writes under date of May 7, 1925:

"The plan as shown in the accompanying sketch map is tentative and subject to modification, of course, as the details are worked out.

"In Cook County alone, the contracts for 1925 are expected to cover approximately 80 miles of new concrete pavement, many of which are paral-

lel to, and will relieve traffic congestion on, some of the thirteen main highways entering the city of Chicago. It is significant that the highway authorities in the region of Chicago have cordially responded to a call issued by the Regional Planning Association to meet and match up at their boundaries both the major and secondary highway routes. As a result of two meetings of this committee, composed of highway engineers of three states, the county superintendents of highways, the Chicago Board of Local Improvements, the Chicago Plan Commission, and the United States Bureau of Public Roads, some very definite progress has been made already in the development of a plan. These officials are charged by law with the design and construction of highways in the region of Chicago. It is they who will carry out any plan that is devised. In our conferences, they have shown broad vision of the problem and a very definite purpose of providing in the most adequate way for the highway traffic of the region.

"Cook County has a construction program of approximately 450 miles of pavement for the next five years. DuPage County has voted a bond issue of $2,150,000 for securing rights of way for two super-highways east and west across that county. The other twelve counties of the region and the state highway departments have large construction programs, which are being merged into one comprehensive scheme designed to serve the region as a whole."

A Notable Park in an Agricultural Town

WAMEGO, KANSAS, has the reputation of being a farmers' town. The strong farmers' cooperative enterprises, such as stores, mills, elevators, and lumber yards, have helped to make it so. It is the headquarters of strong and influential farmers' organizations. The farmers' big summer picnic and the farmers' Chautauqua attract people from a wide territory. Most of the leaders in business and civic life are or have been interested in agriculture, and the same may be said of the citizens themselves.

SCENES IN THE 15-ACRE PARK, BUILT LARGELY BY VOLUNTEER LABOR, IN THE AGRICULTURAL TOWN OF WAMEGO, KANS.—POPULATION 1,700

It is a town whose interest in civic improvement has given it a reputation far beyond the borders of the state. The visitor's impression of the town is the right one when he leaves the train and enters the business section through a town gateway in the nature of a well-kept small park owned by the village. The latest improvement is the three-story community hospital of stone, which cost $35,000, financed by an original gift of $10,000 by a retired farmer and 300 contributions by citizens, lodges, and civic bodies. It is located on a 2-acre site, and its open lawn and beautiful shade trees are a part of well-conceived landscaping plans.

But the pride of the people of Wamego is the city park. Twenty years ago it was a field of wild grass and dandelions, without a tree. Now it is a forest of more than 50 varieties of trees, carpeted with blue grass and well planted with flowers and shrubs. The trees were transplanted by citizens who brought

them from distant hills, and who also went far afield for strange glacial rocks as walls for artificial lakes, fountains, and park buildings.

Twenty years ago 12 acres were purchased at a cost of $2,525 through a bond election. Recently the park board purchased an adjoining 3 acres at a cost of $2,000, to be used as a tourist camp grounds. Improvements in the park are largely due to the voluntary labor and donations of the citizens, since the law did not permit, until recently, a levy for this purpose.

Since 1901 the citizens of Wamego, a town of 1,700 population, assisted by the residents of the farming community, have the following park improvements to their credit:

1. An artificial lake 4½ feet deep, covering 1½ acres, riprapped with frost-proof glacial bowlders, with a made clay-sand bottom which has sewer connections with the river. It holds 1,500,000 gallon of water, supplied from the town mains. It is used for boating and bathing and was built at a cost of $2,500.
2. A built island in the center of the lake.
3. A built wading pool with cement bottom, walled with stone, costing $225.
4. An electric fountain of three basins built of white glacial rocks gathered from the hills. It is 45 feet in diameter and 27 feet high and cost $1,900.
5. A women's rest house, 30 by 16 feet, built of glacial rocks, with shower-baths, dressing-rooms, and a commodious porch, which cost $1,400.
6. A similar comfort house for men.
7. A circular band-stand of glacial rock studded with a great variety of mineral specimens, costing $950, dedicated by the Royal Italian Guards' band.
8. A dancing platform, 40 by 50 feet, with a boxed-in outdoor piano.
9. Playground equipment, partially financed by the junior Chautauqua, costing $400.
10. Three drinking fountains furnished by the Mothers' Club at a cost of $125.
11. Three stone dining-tables, at $150.
12. Two stone ranges at $100.
13. A granite glacial bowlder weighing 17 tons, hauled in by farmers from the hills, 10 miles distant, and mounted on stone at a cost of $125.
14. Baseball, football, and basketball fields, with grand stand.
15. Free tourist camping grounds.
16. Mounted cannon, gravel drives, walks, and park and picnic benches.

The average maintenance expense, cared for by the town, has been about $1,500 per year, including the salaries of caretaker and matron for seven months. No charge is made for the use of the park, except for entertainments for gain. The revenue for maintenance comes from licenses for shows and from the school, church, and general welfare fund.

The park has become a part of the life of the people of the town and surrounding country. It is a widely known picnic spot, and the outdoor ovens are in almost daily use. The last Farmers' Union picnic was attended by 9,000 people. The Chautauqua, junior Chautauqua, and the fall festival are annual events. Band concerts are given twice a week by the Boy Scouts' band. High school, town, and county athletics are held there. Traveling tent shows use the place. The playground and wading pool attract the children, while as many as 75 people are often found at one time bathing or boating at the lake.

The park is of great value to the town through attracting large numbers of people from long distances to enjoy the picnicking, bathing, dancing, and music.

Said a leading citizen, "The park has done more for Wamego than any other one thing we have. It has encouraged higher ideals, enlisted the interest of the community in other enterprises, aroused their civic pride, and last, but not by any means least, has transformed the knockers into boosters."

ACKNOWLEDGMENT.—The foregoing article is reprinted, by permission, from "Rural Planning: The Social Aspects of Recreation Places," *Farmers' Bulletin* No. 1388 of the U. S. Department of Agriculture.

Ideals in City Planning

THE Chicago Plan Commission realizes that the virility and stability of our nation will depend upon what we make of our cities, where over one-half of our people now live. It realizes that a healthy, contented, and vigorous people is the nation's greatest asset; and that cooperation between capital and labor is essential to the nation's well-being.

Capital cannot do without labor, nor can labor do without capital. The business man and the banker, the employer and the employee, the artisan and the laborer, all have interests in common. The Commission realizes that our national well-being (with which that of our city is bound up) is also dependent upon wise legislation, cooperation, and community of action.

The Chicago Plan Commission further realizes that there is no place for congested areas in the well-planned city. Overcrowding makes hotbeds of crime, vice, and disorder. The city that tolerates vile and squalid conditions cannot be really successful.

Hence the Plan Commission regards proper housing, good sanitation, pure air, sunlight, and places of healthful recreation as among the inalienable rights of man. Disregard of them leads to trouble.

Environment molds character for either good or bad. Intelligence, health, and good morals are encouraged by a good environment. Contentment and loyalty thrive in it. Good architecture, harmonious development, and attractive surroundings tend to lift us above the sordid industrial existence into the realm of the beautiful and ennobling things of life. Citizens nurtured in a good environment are those who best perform the world's work.

—From a pamphlet by Charles H. Wacker, Chairman, Chicago Plan Commission.

The Auxiliary Municipal Power-Plant of Oakville, Ontario

By Willis Chipman
Consulting Engineer, Toronto, Ont.

THE town of Oakville, Ont., is situated on the north shore of Lake Ontario, midway between the city of Hamilton on the west and the city of Toronto on the east. Toronto has a population of about 600,000, and Hamilton about 125,000. The distance between the two cities is about 40 miles. Owing to this location, Oakville is a most desirable residential town, and hundreds of business people of the two larger cities make their homes in Oakville.

In 1908 and 1909, when the population of Oakville was less than 2,000, a system of water-works was constructed, the supply being pumped from Lake Ontario through a cast iron intake pipe about half a mile in length into a sedimentation basin with a capacity of over 2,000,000 Imperial gallons. A few years later a sewerage system was constructed, and the sewage was collected at two points, one on the west side of the small river which divides the town into two unequal parts, and one on the east side. The eastern area contains about three-fourths of the population and all the places of business. The sewage is settled in tanks and the effluent heavily chlorinated. The effluent flows into the river about 500 yards from its outlet into the lake. This section of the river near the lake forms a harbor for vessels and, excepting at times of freshets, the current is light. Two service pumps, each with a capacity of 300 gallons per minute, were originally installed for domestic and fire service, as well as one low-lift pump of 600 gallons per minute to pump water from the lake to the sedimentation basin. With the growth of the town, extensions were made in the pipe system year by year, and in 1916 another pump with a capacity of 600 gallons per minute was installed. All these pumps are driven by electric motors, the power being supplied by the Dominion Power and Transmission Company, known as the Cataract Company. The hydro-electric generating station is at De Cew Falls, a distance of 45 miles from Oakville. This hydro plant has been supplemented recently by a steam electric plant near Hamilton. At

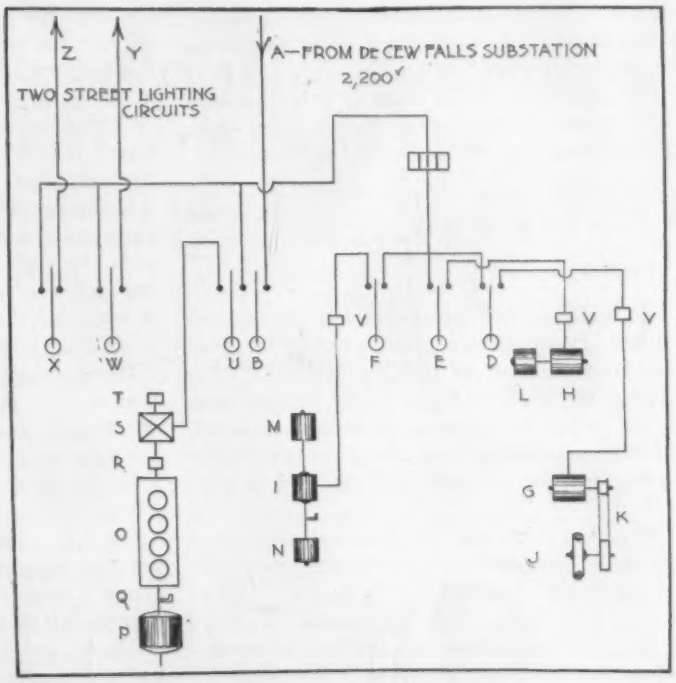


DIAGRAM SHOWING THE GENERAL ARRANGEMENT OF MOTORS, WIRING AND SWITCHES

A, incoming 2,200-volt line from De Cew Falls substation; B, switch from A to C (transformers) and to street-lighting circuit; C, transformers, 2,200/550 volts; D, switch from C to 50-horse-power motor G, 550 volts; E, switch from C to 50-horse-power motor H, 550 volts; F, switch from C to 100-horse-power motor I, 550 volts; G, 50-horse-power motor to drive low-lift pumps; H, 50-horse-power motor to drive pump I; I, 100-horse-power motor to drive service pump M and booster pump N; J, low-lift pump, capacity 600 gallons per minute; K, belt from motor G to pump J; L, 300-gallon turbine pump for domestic and fire service; M, 600-gallon turbine pump for domestic service; N, 600-gallon booster turbine pump for fire service; O, gasoline engine, 280-horse-power at 1,250 r.p.m; P, 1,200-Imperial-gallon turbine pump for fire service; Q, jaw clutch O to P; R, flange coupling O to S; S, electrical generator, 125 kw.; T, 3.2-kw. exciter; U, switch from S to C and street-lighting circuit; V, three starting compensators; W, switch from A or S to circuit Y; X, switch from A or S to circuit Z; Y, street-lighting circuit, east section; Z, street-lighting circuit, west section

Oakville the potential is reduced from 40,000 volts to 2,200 volts at a substation about a mile distant.

As the consumption of water in Oakville increased, the small storage provided by a stand-pipe 16 feet in diameter and 100 feet in height became insufficient to maintain the domestic supply excepting for a short time, and it was useless for fire protection. When interruptions occurred in the electric service due to frazil ice at the power-house, ice storms on the transmission lines, and accidents, the auxiliary steam plant near Hamilton was used to carry part of the load. In February, 1922, the power was off for 71 hours in 5 days, and the town was without water-supply for part of this time and without light for all of it.

The officials then realized the seriousness of the situation and decided to install an auxiliary pumping-plant independent of electric power. Consideration was given to steam power, diesel engines, and gasoline engines. After an exhaustive investigation, it was decided to adopt the gasoline engine as the motive power.

The population of the town at this time was about 3,500 and the power required for public use was 1,034 horse-power, as follows:

For water-works pumps.....	80 kw. or	107 h.p.
For street lighting.....	50 kw. or	67 h.p.
For private lighting and power..	645 kw. or	860 h.p.
Total	775 kw. or	1,034 h.p.

The water-supply for domestic consumption and for fire service was considered of the first importance, and street lighting desirable. The interruption in the electric power service was not of sufficient duration, however, to warrant the expense of installing an auxiliary power-plant for private lighting and power users.

For fire service the old pumps had a safe capacity of 900 gallons per minute, one 300 unit not being considered as in service. These required 150 horse-power for operation. For the daily ordinary domestic service, however, from 40 to 80 horse-power was required.

It was eventually decided to install a 240-horse-power Sterling gasoline engine, direct-connected at one end with a turbine pump of 1,200 Imperial gallons per minute capacity, against a head of 300 feet requiring 160 horse-power on the shaft, and at the other end of the engine an electric generator of 125 kw. capacity. Suitable clutches connected and disconnected the pump and the electrical generator from the engine. By this arrangement, if the electric power on the transmission lines should be interrupted, the gasoline engine can be started within five minutes to operate the electric generator, which in turn would drive the three motor-driven pumps for domestic service, taking 40 to 80 horse-power. As the generator has a capacity of 235 kilowatts, there is a surplus of 86 to 126 horse-power for street lighting. If, however, water should be required for fire service in excess of the capacity of the old electric pumps, the generator could be cut out and the turbine pump operated by the engine. When this pump is being operated at full capacity, the street lights are cut out. The probability of a fire's occurring when the electric power from De Cew Falls is interrupted is, however, very remote, and an interruption of two or three hours as a maximum will probably occur not more than once per year on an average.

The primaries from the substation enter the pump-house to a main switchboard to which the electric circuit is also delivered from the generator driven by the gasoline engine. By means of switches, either source of electric power can be connected with the motors to drive the pumps, and with the two street-lighting circuits.

The motors that drive pumps are each provided with a watt-hour meter, thus enabling the operator to determine the power used. The output of the generator is also recorded by meter. A Venturi meter with register records the water pumped, and pressure-recording gages give the pressures carried. There is every facility in the pump-room for determining the efficiency of each unit at any time.

In 1923 the maximum daily water consumption was at the rate of 500 Imperial gallons per minute, and the daily average 300 gallons per minute. The maximum demand for one hour, however, was 900 Imperial gallons per minute, or the full capacity of the old pumps.

Electric power at Oakville costs one cent per horse-power-hour, and gasoline power about 3 cents per horse-power-hour at the current price for gasoline. Assuming a demand of 100 horse-power for one hour, the extra operating cost for the gasoline engine unit is $2.

The new pumping unit is a Rees-Roturbo, manufactured by the Goldie-McCulloch Company of Galt, Ont. This pump has an efficiency of 76 per cent at full load, as determined by actual test. The gasoline engine is an 8-cylinder Sterling G.R.C. rated at 242 horse-power at 1,200 r.p.m. The gasoline consumption is guaranteed not to exceed 1/10 of a gallon per horse-power-hour. The engine was tested by the writer at different speeds under different loads at the Sterling Engine Works, Buffalo, N. Y., before shipment.

ENJOYING THE SAND-PILE IN A PLAYGROUND IN CENTRAL FALLS, R. I.

Rhode Island Cities Organize Public Recreation Under New State Law

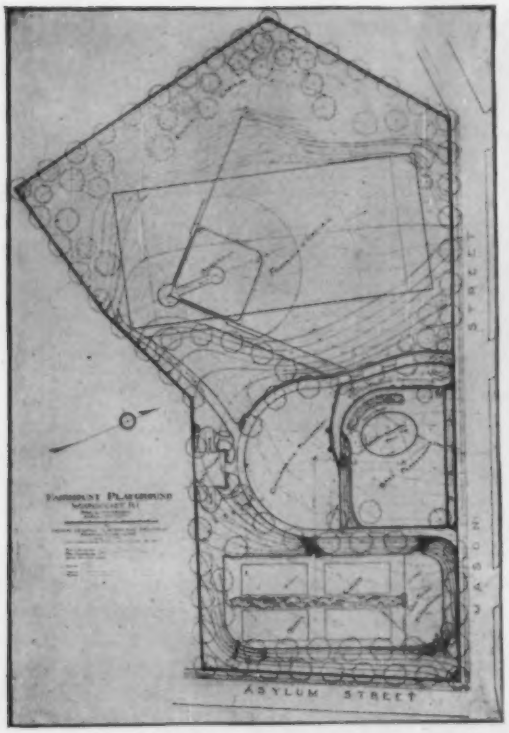
By Arthur Leland
Landscape Architect, Recreation Consultant, Newport, R. I.

RHODE ISLAND, the smallest and most thickly populated state in the Union, has at last awakened to the need of public recreation. Working with the hearty support and cooperation of the *Providence Journal,* the leading newspaper in the state, the Playground and Recreation Association of America has achieved noteworthy results. The key to the door of recreation in Rhode Island is the passage of an excellent state law which was put through the Legislature at a time when there was an absolute blockade of all acts, even finance bills for the support of state institutions. In the House the act was introduced by a Democrat, and a Republican moved for immediate passage by unanimous consent. In the Senate the act was introduced by a Republican, and a Democrat moved for immediate passage by unanimous consent. The passage through the Legislature and the signature of the Governor required two and one-half days—record time. The text of the bill is as follows:

It is enacted by the General Assembly as follows:

Section 1. Chapter 47, of the General Laws, entitled Of the Powers of, and Of Suits by and Against, Towns, is hereby amended by adding thereto the following section.

"Section 24. The city council of any city or the town council of any town may vote to establish a system of public recreation and may by ordinance or resolution vest in the school committee, or in the board in control of public parks, or in a board of recreation established as hereinafter provided for, the authority to establish, construct, equip, control and maintain public playgrounds, athletic fields, swimming pools, bathing places and other community recreation centers, and to conduct and promote recreation, play, sport, and physical training, for which admission or other fees may be charged. If said city council or town council shall vote to establish a board of recreation, said city council or town council shall by ordinance or resolution specify the number of the members on said board of recreation, the manner of their appointment and the term for which they are chosen, and may provide that a member of the school committee, a member of the city council or town council and a member of the board of control of public parks in said city or town shall be ex-officio members of said board. Such board or committee that may be authorized to exercise said powers, may conduct its activities on land and in buildings, adapted or adaptable for such purposes, owned by said city or town, with the consent of the committee or board in control



of said property, or on land or in buildings that may hereafter be acquired for such purposes by gift, purchase or lease; and may also in its discretion take charge of and use any places or place which any person or persons may offer the use of for purposes herein enumerated. Said board or committee may employ a superintendent of recreation, teachers and other officers and may fix their compensation. Said board or committee may authorize the use of such property under its control for any other municipal purposes, or by any person, society, or other organization for such other public, recreation, social or educational purposes as said board or committee may deem proper. The respective boards or committees of two or more towns or cities exercising the powers conferred by this section may vote to unite as a joint committee for the purpose of employing a superintendent of recreation, teachers, supervisors and other officers, may fix their compensation, and shall apportion the amount to be paid by each of such towns on the basis of the next preceding Federal census. Such joint committee shall be the agent for each town represented thereon. Any city or town may appropriate money for the acquisition by lease or purchase, or for the equipment, of land or buildings for the purposes herein enumerated; for the operation of such playgrounds and recreation places; and for the carrying on of such recreation activities.

Section 2. The provisions of this act shall not affect the provisions of any public law or special law respecting any particular city or town, none of which are repealed hereby.

Section 3. This act shall take effect upon its passage.

Signed by Governor, March 15, 1924.

At least three of the cities were ready to make their appropriations under the provisions of the new act while it was being acted upon by the Legislature. Working under the provisions of the act, within a week after its passage, appropriations were made making it possible to carry out the following program:

BRISTOL
- Board of Recreation established.
- Appropriation of $1,500 for playgrounds and $250 for bath-houses. (Largest appropriation heretofore, $500.)
- New playground and athletic field opened. Running two centers this season.
- Trained superintendent appointed and staff of five workers. Increase of four in personnel of department.
- Broad program, including evening activities for adults.

WICKFORD
- (Town of North Kingston, pop. 3,397.)
- Board of Recreation appointed.
- First municipal appropriation, $1,000.
- Trained superintendent and two women workers.
- Full day program for children, including water sports; evening activities for adults.

CENTRAL FALLS
- (Pop. 25,000—one of the most thickly populated square miles in the world.)
- Board of Recreation established.
- Appropriation of $4,100, an increase of $3,500 over 1923.
- Three new playgrounds opened.
- Trained superintendent and staff of eight workers, an increase of eight in personnel over 1923.
- Full day and evening program, including activities for adults.

WOONSOCKET
- (Pop. 40,000).
- Work under the Park Department.
- $5,000 appropriation. (Increased to $13,000 in 1925.)
- Conducting five playgrounds and athletic fields, an increase of four over 1923.
- Trained superintendent appointed. Staff of 16 assistant leaders; an increase of 15 in personnel over 1923.
- Employment of recreation consultant and landscape architect, to draw landscape plans for the development of the park and playground areas. Outdoor theater authorized.
- Year-round recreation program established.

WARREN
- (Pop. 12,000.)
- Appropriation of $1,500 for development of playground.

PAWTUCKET
- (Pop.. 64,898.)
- $25,500 appropriated 1924-5 for development of playfield.
- Institute for play leaders held under auspices of School Committee.

Providence and Newport have for many years been pioneers in playground work.

EDITORIAL NOTE.—For years the field secretaries of the Playground and Recreation Association of America have been working on the passage of enabling-legislation for recreation, and the laws which have been passed in nineteen states have been exceedingly helpful in state-wide development. In the past certain cities have had to secure the passage of such laws to fit their individual needs, and this has often been a lengthy process.

An All-Year-'Round Swimmin' Hole

By H. C. McClure
City Engineer, Flint, Mich.

A SWIMMING POOL layout of rather unusual arrangement has been designed and constructed by the City Engineering Department for the Park Board at Flint, Mich.

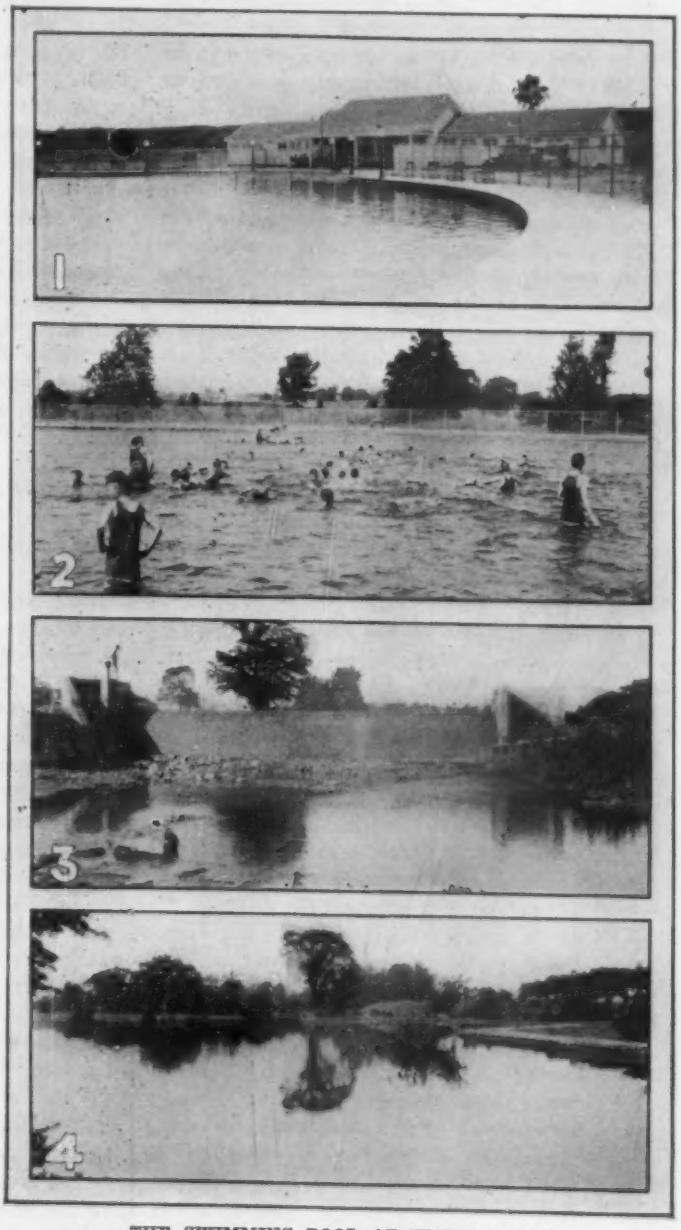
Through what is known as Swartz Creek Parks winds a clear, lake-fed stream, providing at all times during the summer a supply of fresh spring water. Natural pools at the bends in this creek have always been favorite "swimmin' holes" for youngsters and even grown folks from a big area around, The Park Board sought to capitalize this feature, and did so as follows:

A flat area along the creek was selected as the site for a swimming pool. This area is located near one end of the park and is cut off from the rest of the park by the creek on one side and an abrupt bluff bank on the other. It lends itself naturally to a separate development.

Just above this site, a location was selected for a low-head dam. It was planned to impound as large a head of water as possible without flooding any of the creek holes of a fine municipal golf course, located just a little further upstream. From this impounded supply, a feed line was led to the pool, making possible a continuous and constant supply of clean, fresh water. The overflow from the pool was returned to the creek below the dam.

A club-house, with ample locker-room and a public rest room which can be heated during the skating season, was located facing the pool and park.

It was found that the elevations along the golf course, the elevation of the creek below the dam, and the desired depth of 8 feet of water in the pool, allowed but 1 foot difference in elevations of water at the dam and in the pool. With only



THE SWIMMING POOL AT FLINT, MICH.
1. Club-house and locker-rooms. 2. Safety ropes at 4-foot depth. 3. Below the dam; about one inch of water coming over. 4. Lagoon for boating, above the dam

this difference, however, it is possible to furnish at least a million gallons of fresh water per day to the pool at all times.

The dam is of monolithic concrete section, with a spillway the entire width of the dam. It is also equipped with a hand-operated 6 x 4-foot by-pass gate to drain the pond, if necessary. A valved line, 18 inches in diameter, properly screened, is led to the pool.

The 18-inch wood-stave supply line to the pool is led to a valve-chamber at the pool. Here, this line branches, and valved lines go to the pool or directly to the creek.

By closing the creek line and opening the other two, the fresh-water supply goes directly to the center of the pool. The surface overflow is connected to the creek line outside of the valve chamber. This is the set-up during the bathing season.

By closing the pool branch and opening the other two, the pool water is held at a stationary level and the supply is wasted directly to the creek. This is the set-up during the skating season or at times during the summer when heavy rains tend to cloud up the water.

By closing the supply and opening the other two lines, the pool drains to the creek. This is the set-up when the pool is drained for cleaning. City water connections are provided for flushing down the pool at these times.

In addition, the valved connection at the dam will cut off all supply if any work in the valve-chamber is necessary.

Design of the Pool

The final design of the pool called for a circular pool 250 feet in diameter, sloping from an 8-inch depth at the edge to an 8-foot depth at the center. In front of the club-house location, the circular outside wall was dropped and the bottom slab carried to the ground surface. This allows for a "feather-edge" depth of water here. A quantity of beach sand was hauled in, the area out to approximately 18 inches deep roped off, making a safe beach for kiddies.

The entire pool is constructed of 1:2:4 reinforced concrete. It includes a circular outside wall 5 feet deep, a 6-inch slab over the entire area, and a 10-foot sidewalk around the entire pool. The area in front of the club-house is also concrete paved, with separate bathers' walks leading to the locker-rooms.

The bottom slab of the pool is divided into two rows of wedge-shaped sections along radial lines. The center panel, 25 feet in diameter, is flat. Around this panel at the circular center joint, at the outside wall, and along all radial lines, construction joints were made. They consisted of a 12 x 12-inch foundation under the slab, with a taper joint opening made by using wedge-shaped boards. These joint openings were all filled with hot asphalt.

The slab and wall were reinforced with bar reinforcing, and the sidewalk, front paving, and floors of the club-house, with wire mesh. The sidewalks, floors, and slab were troweled smooth, and the slab lightly brushed with a common broom.

A 6-foot wire fence encloses the pool and area in front of the club-house. On the fence at frequent intervals are mounted flood-lights. In front of the club-house, the lights are mounted on ornamental posts, and a large spot light plays on the diving platform at the center of the pool.

The fence surrounding the pool was furnished and installed by the Anchor Post Iron Works, of New York. The 18-inch wood-stave pipe inlet line from the dam to the pool was furnished by the Michigan Pipe Company, of Bay City, Mich; the sluice-gates by the Coldwell Wilcox Company, of Newburgh, N. Y.; and the 18-inch flap-gates and shear-valves by the Michigan Valve and Foundry Company, of Detroit. The lockers for the bathhouse were made by the Durabilt Locker Company, of Aurora, Ill.

Club-House and Locker Rooms

The club-house is of frame construction and of colonial design to match the golf club-house. It includes a large center entrance and a public waiting and rest room, with two large locker-rooms adjacent. The public rest room provides for checking, locker registration, etc.

The locker-rooms are equipped with steel lockers. At each locker-room exit to the pool are located a foot-pool and continuously running showers. It is impossible for bathers to gain access to the pool area without going through the checking turnstiles, through the locker-rooms, and through the foot-pool and showers. Exit must be made in reverse order. Mothers are allowed to go through the rest room to the veranda on the pool side to keep watch over the children on their beach. Toilet-rooms, accessible only from the locker-rooms, and others accessible from the rest room, have been provided. During the skating season, the rest room only will be heated for use.

With the constant, ever changing supply of fresh spring water for bathing at no expense for water or pumping; with the children safely taken care of, and 8 feet of water for the experts, and with the possible use of the pool during the winter months for cold-weather sports, the Park Board feel that it has a most unusual and most satisfactory layout.

A New Institutional Sewage Treatment Plant

Installation for the Plymouth County Hospital, South Hanson, Mass.

By J. F. Pierce

Assistant Engineer, Metcalf & Eddy, Boston, Mass.

THE sewage treatment plant at the Plymouth County Hospital, South Hanson, Mass., built in 1919 to take care of 75 people, soon became overworked when additions to the buildings were made to accommodate 200 persons. As the number of patients increased, the inadequacy of the filter beds to properly take care of the sewage became apparent.

In the summer of 1923 the beds, which were located a short distance from the hospital, became so saturated that the liquid overflowed into a path near-by and followed the ruts down a slope, creating a breeding place for mosquitoes and other vermin. The situation became very offensive, and Metcalf & Eddy, consulting engineers, of Boston, Mass., were asked to study the conditions and make recommendations.

Early in 1924 the engineers suggested the abandonment of the old plant and the construction of a larger one in the woods about a half-mile from the hospital, to consist of an 8-inch trunk sewer, sedimentation tanks, dosing tank, sand filters covering half an acre, and an open channel to carry the effluent into a pond that was close to the proposed site. The general plan and details of construction of the plant are shown in Figs. 1 and 2.

The plans were approved by the Massachusetts Department of Public Health, and the County Commissioners were authorized to issue bonds to finance the construction. On June 1 the contract was let to George Howard & Sons, of Brockton, Mass., for $18,200, and work was started the next day.

A study of the water consumption at the hospital showed that over a period of four months the average daily use was 28,270 gallons per day, which included the water used for culinary purposes, baths, toilets, laundry, ice machine and boilers for 125 people, giving an average of 226 gallons per day per capita. Making allowance for boiler water and that used in the ice machine, which discharges into a separate line, the amount to be treated was fixed at 160 gallons per day per capita, or 32,000 gallons per day for the present capacity of the hospital.

From the hospital the sewage is delivered through 2,100 feet of 8-inch vitrified clay pipe

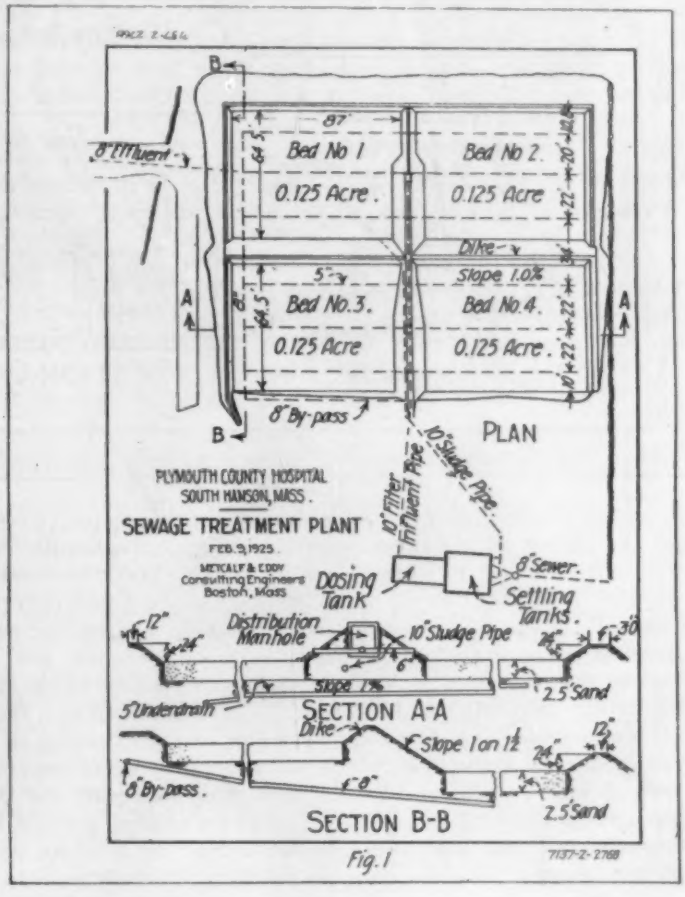


Fig. 1

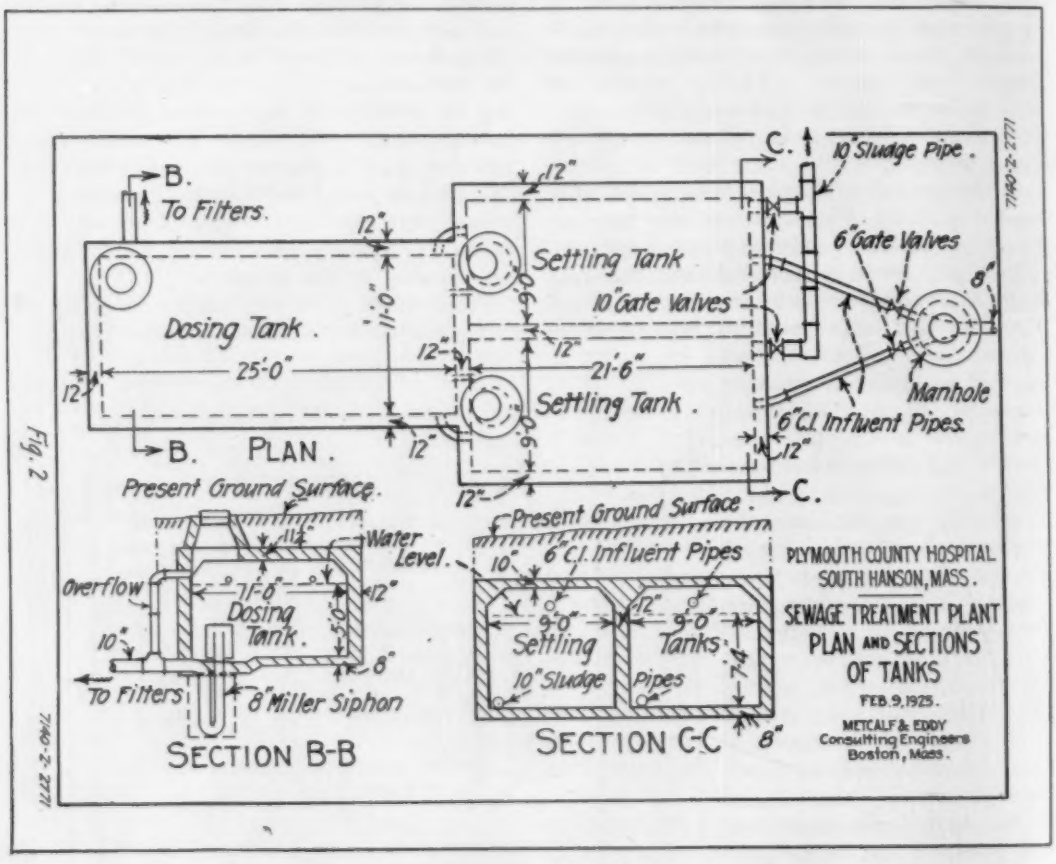
to a manhole which divides the flow into two streams, each stream flowing through a 6-inch cast iron pipe into one of the twin settling tanks. Each tank is connected to the dosing tank by two 6-inch tees placed 15 inches from the underside of the roof of the tanks.

When the liquid reaches a depth of 4 feet 11 inches in the dosing tank, an 8-inch Miller siphon automatically discharges the 10,000 gallons through a 10-inch vitrified pipe onto the beds, where it passes through the depth of

After the stumps were removed, the loam was placed in storage piles and later used for finishing the dikes.

The filter area is divided into four independent beds, each one comprising ⅛-acre of sand, and enclosed by earth dikes 2 feet high above the sand, 1 foot across the top, and with sloping sides of 1 on 1½. Running through each pair of beds are three lines of underdrains connected to an 8-inch effluent main at one end of the filter.

The underdrains are of 5-inch vitrified clay



30 inches of sand into the underdrains, out into the effluent channel, and into the near-by pond. By means of distribution manholes equipped with shear-gates, it is possible to divert all of the flow onto one bed, and by changing the positions of the gates daily so that the beds are used in rotation, every bed will have a three-day period of rest.

It was necessary to clear nearly an acre of land on the site of the filter, which was mostly small growth, with possibly a dozen trees large enough to be cut into box logs. The underbrush and cord wood were hauled away and the stumps were loosened by blasting.

pipe laid in trenches on a 1 per cent grade. The bed for the pipe was made of a 2-inch layer of coarse sand upon which was placed a 3-inch layer of medium stone (retained on a ¼-inch screen). Two-thirds of the bell was removed and the pipe was laid with open joints on the stone. The remainder of the hub served as a support for the adjacent pipe with an opening of ⅜-inch between sections. To prevent sand or other foreign material from entering the drain, the pipe was surrounded with a 3-inch layer of coarse stone (retained on a 1-inch screen) on top of and outside of which was placed another 3-inch layer of me-

dium stone. Where the underdrains passed through the dikes, the pipe was laid with cement joints.

Sand for the filters was hauled onto the beds by motor trucks having a capacity of 2½ yards. The pit was located 3 miles away, where sand fulfilling the specifications was easily obtained without screening. The trucks were loaded by a mechanical loader. The sand was spread to a depth of 34 inches to allow for settlement on flooding the beds.

Frequent samples of the sand were taken and tested to see if it came up to the specifications, which were as follows:

"The effective size of the sand shall not be less than 0.2-millimeter nor more than 0.35-millimeter. The uniformity coefficient shall not be greater than 3.0. The sand shall be substantially free from particles over ¼-inch in diameter. It shall be practically free from loam, clay or dust or perishable matter."

The settling tanks, which are of reinforced concrete, are built in the ground, and have a capacity of 10,000 gallons each. The tanks were designed for a theoretical detention of 15 hours under capacity conditions. They are similar in size, the inside dimensions being 9 feet 0 inches x 23 feet 6 inches x 10 feet 6 inches with a floor sloping 3 inches towards the sludge outlets. The walls are of 12-inch concrete reinforced with ⅝-inch steel; the roof is 10 inches thick, of concrete with ⅝-inch reinforcing, and the floor 7 inches thick, of concrete with no reinforcing. The water-level is 7 feet 4 inches above the floor.

The tanks are independent of each other, and each one may be cleaned by closing the inlet valve and opening the 10-inch valve on the sludge line. The sludge is discharged onto one of the beds, where, after drying, it will be removed and disposed of.

The grade of the trunk sewer line was designed for a minimum velocity of 2.5 feet per second when flowing full or half-full. The joints on the 8-inch line were made up with jute and G-K compound. The latter was shipped in metal drums containing 150 pounds each, which were easily broken open with an ax as needed. The compound was melted in a tar kettle set over a wood fire. A little difficulty was experienced at first in keeping an even temperature with the wood fire, but after a few days this was overcome. The compound was broken up into pieces weighing about a pound before it was placed in the kettle. After reaching the melting point it bubbled considerably for about ten minutes and then was ready for pouring into the joints.

The joints were poured in a way resembling that of the pouring of water-pipe joints. They were thoroughly calked with yarn or jute to prevent the compound from running into the pipe. An asbestos gasket, soaked in water to prevent the compound from sticking, was placed around the opening of the joint, clamped at the top and a little off center. It was found that by banking the edge of the gasket with wet dirt the hot material would not leak out. To obtain satisfactory results, the molten material should be properly "cooked"; if too hot, the mass becomes carbonized and unfit for use, and if too cool it becomes solid and cannot be poured.

It was found advisable to make all joints in the trench. One man attended the fire and handed the hot material to the pipe layer in the trench. Assisting him was a laborer in the trench who prepared the bell-holes and helped lay the pipe, while another passed the pipe down from the bank. Between 60 and 70 joints could be made in a day. Each joint required a pound and a quarter of the compound.

Securing Good Neighborhood Environment Through Platting Control

A GOOD neighborhood environment involves opportunities for contact with gardens, trees, natural landscape features, and extended water and sky views. It involves opportunities for walks in quiet places. It involves ample play space for the children, both in private gardens about the homes and in a "commons" serving an entire block or subdivision.

One of the prime purposes of platting control should be the conservation of natural beauty to the fullest extent consistent with use for residence purposes. A clump of trees, a wooded ravine, a rocky ledge, a water view, is a community asset of very real value. It should be conserved for the community, either on private property through an appropriate public easement or as a small park or commons.

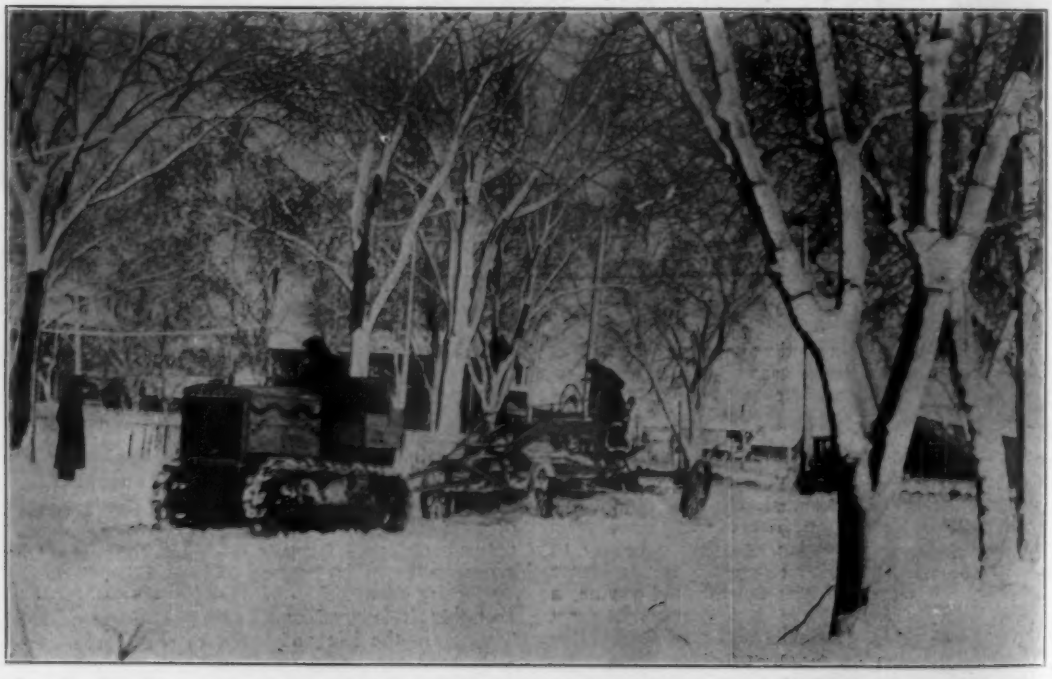
Daily contact with nature in some of its varied forms is an essential of healthy, normal living. It has an undoubted energizing, tonic effect that is no less real because incapable of actual measurement. It has a restful effect on eye and nerve and aids clarity of thought. It facilitates a sane, joyous outlook on life. It stimulates and it inspires. Every human being finds natural beauty pleasant and agreeable. Men differ in their tastes as to dress, as to architecture, and as to all forms of art; but there is no real disagreement as to natural objects. Beauty of form and color in growing things is innate; and its universal and instinctive recognition by humans is due to the fact that it is good and has a real function and purpose in the life and work of the world.

—From a paper by Robert Whitten, on "The Control of the Subdivision of Land into Building Lots," presented at the International Town, City and Regional Planning Conference in New York, April, 1925.

Clean Your Streets Summer and Winter

FOAMITE-CHILDS PICK-UP SWEEPER OWNED BY FORD CITY, PA.

This sweeper was purchased in June, 1924, and used to sweep the streets until November 17. It was then stored until spring. During this period it swept 371 miles of streets at a total cost of $389.65, or approximately $1.05 per mile. This cost includes the operator, gas, oil, other accessories and the refilling of brooms, but does not include the removal of the sweepings. The major part of the streets are newly paved with a high crown and it was not necessary to sweep the entire width of the street, as the dirt was fanned by traffic from the center toward the curb. We are indebted to Charles Stewart, President of the Ford City Borough Council, for this illustration and information



SNOW REMOVAL IN ROCKFORD, ILL., WITH A 5-TON HOLT TRACTOR AND A 10-FOOT ADAMS LEANING-WHEEL GRADER

Photograph and information furnished through the courtesy of B. C. Harvey, City Engineer, Rockford, Ill.

Water-Supply Statistics for Municipalities of Less Than 5,000 Population--V

Statistics from 3,700 Cities Compiled for Publication in THE AMERICAN CITY and the 1925 Municipal Index—The Following Explanatory Material Is Reprinted from Our February Issue

THROUGH the cooperation of municipal water-works officials and the officers of water companies, THE AMERICAN CITY MAGAZINE is able to offer to its readers and to recipients of the 1925 Municipal Index the largest compilation of water-supply statistics that has yet been published. In order to facilitate the distribution of these statistics, all the data for cities of over 5,000 population are being published in the 1925 Municipal Index, and for cities of less than 5,000 population in THE AMERICAN CITY MAGAZINE serially, beginning with February, 1925.

The tables, in which the cities are arranged alphabetically by states, show whether the water-works are owned by the municipality or by a private company. The source of supply is recorded merely as underground or surface, the former including shallow wells, deep wells, artesian wells, flowing springs, and mountain springs, and the second such sources as rivers, lakes, ponds, canals, and creeks.

The distance of the source from the city is an important matter from the fire protection standpoint as well as from the standpoint of comparison when it comes to capital investment. Storage facilities are described under three heads, namely, reservoirs, stand-pipes, and elevated tanks.

Filtration systems are divided into mechanical or American systems, slow sand filtration or the older type of filtration, and pressure filters, as applied to the mechanical filtration. In examining the entire set of reports, only chlorine and hypochlorite show as American sterilization practice to-day, with liquid chlorine by far the most common method.

In order that some idea of the total investment in pumps may be reached, the total pump capacity in million gallons daily is recorded. In some instances where low-lift pumps are used to move water from a river to a filtration plant and then high-lift pumps are used to force the filtered water through the distribution system, the total pump capacities may give an erroneous idea as to the capacity of the system. Lack of space, however, made it impossible to differentiate in these cases, as the pump capacity is recorded chiefly to show the investment in this element of the plant.

American cities are noteworthy for their excessive consumption of water. Even communities where industrial uses are not great have consumptions of 500, and some even as high as 1,000 gallons per capita. As far as possible, in these statistics domestic services are differentiated from those supplying stores, factories and industries.

Statistics are given for the number of hydrants in each city and whether they are owned by the municipality, or by the water company. The average rental per hydrant per year is given in those cases where a hydrant is charged to the water company or is credited to the account of a water department. In many cases water companies charge no hydrant rental, as such service is required in their franchise. Unfortunately, in only a few cases are water departments credited with the maintenance of the hydrants.

The average pressures for water-supplies, as well as the increased pressures for fire service, are given, as this has some bearing on the general type of pipe in use.

The following symbols are used throughout these tables to make it possible to give a greater amount of information in small space:

A —American type, rapid or mechanical filter
B —Brass pipe
C —Concrete pipe
Ch —Sterilization by liquid chlorine
Cl —Cement-lined pipe
Co —Copper pipe
F —Pressure filter
G —Galvanized iron pipe
H —Consumer or householder
Hy—Sterilization by hypochlorite
I —Cast iron pipe
K —Kalamein pipe (also Calamein and Calamine)
L —Lead pipe
Ll —Lead-lined pipe
M —Municipally owned
O —Slow sand filter
P —Owned by private company
Pp—Stand-pipe
R —Storage or distribution reservoir
Ri —Rolled iron pipe
Tc —Terra cotta pipe
Rv—Riveted pipe
S —Surface source of water-supply
So —Water softener
St —Steel pipe
T —Elevated tank
Tl —Tin-lined pipe
U —Underground source of water-supply
V —Vitrified pipe
W —Wood pipe
Wr—Wrought iron pipe

Municipality Ownership of Water works	Population	Source: Type	Source: Aver. Miles from City	Storage	Filters	Sterilised	Distribution System: Total Miles of Main	Distribution System: Kind of Pipe: Mains	Distribution System: Kind of Pipe: Services	Pipe Sizes Inches: Mains	Pipe Sizes Inches: Services	Pump Capacity m. g. d.	Main Supply Met-
NEW YORK (con.)													
South Glens Falls.....M	2,158	U	0.0	RPp	No	No	8.0	I	G	6–12	1½–3¼	1.9	No
Spencerport.....M	848	U	1.5	Pp	No	No	4.5	I	G	4–10	1½–2	1.4	No
Stamford.....P	973	U	3.0	R	A	Hy	7.0	I	LI	4–8	.....	0.6	Yes
Suffern.....M	3,500	U	0.5	R	No	No	10.0	I	I	4–12	.....	0.3	No
Ticonderoga.....M	4,000	S	1.0	R	.....	No	7.0	I	G	4–12	.....	.....	No
Turin.....M	1,016	U	2.0	R	No	No	7.0	I	G	4–8	1½–3	.....	No
Unadilla.....M	2,395	SU	....	R	No	No	9.3	I	G	3–6	.....	1.2	...
Valatie.....M	1,350	S	....	Pp	.....	.....	5.0	I	G	4–10	.....	2.0	...
Warrensburg.....P	2,000	S	2.0	.....	.....	.....	4.0	I	.....	4–6	.....	.....	...
Warsaw.....M	3,622	U	6.0	R	0	No	22.0	I	GL	4–12	1½–3¼	None	No
Washingtonville.....M	800	S	2.0	.....	.....	.....	6.0	.....	.....	4–10	.....	.....	No
Waterford.....M	4,400	S	0.5	Pp	A	Ch	11.0	I St	GIBL	1¼–12	¾–6	7.0	Yes
Waterloo.....P	3,809	S	1.0	RPpT	A	.....	....	I	G	2–12	.....	1.0	No
Waterville.....M	1,410	S	3.0	R	0	No	8.3	I	G	6–16	¾–2	.....	No
Wayland.....M	1,900	U	0.5	R	No	.....	7.0	I	G Wr	4–8	.....	0.7	No
Webster.....M	1,500	U	3.0	Pp	No	No	4.6	I	G	4–10	1½–2	0.3	No
Weedsport.....P	1,500	U	3.5	R	No	No	7.8	I	G	4–8	.....	0.4	No
Wellsville.....M	4,996	S	1.0	R	A	Ch	17.2	IW	G	4–14	¾–2½	2.75	Yes
Williamson.....M	3,293	S	4.0	R	0	No	5.0	I	G	6–10	¾–2	0.5	No
Williamsville.....M	2,000	U	....	Pp	No	Ch	4.5	I St	G	4–10	.....	0.3	No
NORTH CAROLINA													
Bessemer.....M	3,000	S	3.0	RT	0	Ch	16.0	I St	G	1½–8	¾–1	1.1	No
Brevard.....M	1,750	S	2.0	R	No	Ch	13.0	I	G	2–6	1½–3	None	No
Clayton.....M	1,500	U	0.8	RT	No	No	4.0	I	G	6–10	¾	2.2	No
Clinton.....M	2,500	U	0.1	RPp	No	No	3.5	I	G	6–10	.....	0.4	No
Davidson.....M	1,176	U	0.3	RT	No	No	3.8	I	.....	1½–10	¾–1	1.6	Yes
Dunn.....M	3,500	SU	0.1	.....	.....	Ch	7.0	I	G	4–8	¾–3	1.4	No
Elkin.....M	2,500	S	1.0	RT	0	Ch	8.0	I St	G	1½–8	.....	1.2	No
Graham.....M	2,366	U	0.5	RT	No	No	7.0	I	G	4–8	.....	1.3	No
Kernersville.....M	2,000	U	0.0	RPp	No	No	6.0	I	.....	1½–8	.....	0.4	No
Leaksville.....M	2,500	S	2.0	RPpT	0	Ch	7.5	I	G	2–12	¾–3	2.5	No
Littleton.....M	1,400	U	0.1	RT	.....	.....	6.0	I St	G	1½–8	.....	0.2	No
Louisburg.....M	1,775	S	0.1	RPp	0A	Ch	4.0	I	G	4–12	¾	1.4	Yes
Lumberton.....M	4,500	S	2.0	RPp	A	Ch	6.0	I	I	6–10	.....	1.6	Yes
Maxton.....M	1,397	U	0.0	.....	No	No	3.0	I	G	4–10	¾	1.9	Yes
Mebane.....M	.....	S	1.0	RPp	A	Ch	....	I	G	6–8	¾	1.9	No
Morehead City.....M	2,958	U	....	Pp	.....	Ch	4.0	.....	.....	6–8	.....	.....	No
Morganton.....M	4,500	S	14.0	RPp	.....	Ch	10.0	.....	.....	2–12	.....	.....	Yes
Mt. Airy.....M	4,752	S	2.0	RPpT	A	Ch	12.8	I St	G	4–10	¾–2	1.3	No
Mt. Holly.....M	3,000	U	0.0	Pp	No	No	6.5	I St	G	1½–6	½–1½	0.1	No
Mt. Olive.....M	3,000	U	....	RT	.....	.....	4.0	I St	G	1½–10	¾	1.3	No
Murphy.....M	1,500	S	1.0	R	0	Ch	15.0	I	I Te	4–10	.....	None	No
Raeford.....M	1,500	U	1.0	RT	No	No	15.0	I St	G	1½–10	¾–1	0.3	No
Red Springs.....M	.....	U	0.5	RT	No	No	4.5	I	G	6–8	¾	0.4	No
St. Pauls.....M	1,400	U	0.0	T	No	No	3.0	I	G	2–8	.....	0.2	No
Scotland Neck.....M	2,500	U	1.5	RT	No	No	10.0	I St	G	1½–8	2½	2.5	No
Snow Hill.....M	1,000	U	0.5	T	No	No	3.0	I St	G	1½–8	¾–1	0.1	No
Spencer.....M	2,500	U	0.0	RT	No	No	4.0	I St	G	2–8	¾	.....	No
Wake Forest.....M	1,400	S	1.3	RT	0	Ch	4.0	I St	G	6–8	¾	0.9	No
Warsaw.....M	1,200	U	....	T	No	No	5.0	I	G	6–8	¾	0.3	No
Waynesville.....M	2,008	SU	5.0	R	.....	.....	12.0	I	.....	4–10	.....	None	...
NORTH DAKOTA													
Beach.....M	1,200	U	0.0	T	No	No	....	I	L	.....	.....	0.007	No
Bottineau.....M	1,232	U	0.0	RPpT	No	No	3.0	I	.....	.....	.....	.....	...
Casselton.....M	1,538	U	0.5	Pp	No	No	4.0	I	I	4–8	¾	.....	No
Ellendale.....M	1,334	U	0.0	T	No	No	5.0	I	GIL	4–6	.....	2.9	No
Enderlin.....M	2,200	U	0.8	Pp	A	No	5.0	I	.....	2–6	.....	0.3	No
Glen Ullin.....M	971	....	0.3	R	.. ..	.....	0.8	.....	.....	6	.....	.....	...
Grafton.....M	2,512	U	....	....	....	....	4.0	.....	I	4–8	.....	0.04	...
Hankinson.....M	1,575	U	0.5	RPp	No	No	5.0	I	L	4–8	1½–1	1.0	Yes
Larimore.....M	1,400	U	0.0	R	No	No	10.0	I	.....	4–6	.....	1.3	No
Lisbon.....M	1,855	U	0.3	RPp	No	No	5.0	I	G	4–6	.....	0.1	No
Marmarth.....M	1,318	U	0.1	RPp	.....	.....	4.0	I	G	3–8	¾	.....	Yes
Mayville.....M	1,218	S	....	T	No	....	2.5	.....	L	4–6	.....	0.8	No
Rugby.....M	1,424	U	0.0	Pp	No	No	2.0	I	I	6–10	¾	0.01	No
Williston.....M	4,500	S	1.0	T	0	Hy	4.0	I	LG	4–12	¾–2½	0.7	No
OHIO													
Ada.....P	2,321	U	0.3	T	No	No	6.0	I	G	4–12	¾–2	0.8	No
Andover.....M	1,200	U	0.3	T	No	No	4.0	I	G	4–8	¾	0.4	No
Arcanum.....M	1,311	U	0.5	.....	.....	.....	4.0	I	.....	4–10	.....	1.5	Yes
Archbold.....M	1,082	U	0.3	PpT	No	No	2.8	I	G	4–6	.....	0.2	No
Barnesville.....M	4,865	S	2.0	R	A	Ch	14.0	I	IL	4–12	.....	2.0	Yes
Bradford.....M	2,356	U	0.5	Pp	No	No	7.0	I	L	4–8	¾	0.3	Yes
Bridgeport.....M	3,977	U	3.0	R	No	No	5.0	I	G	4–10	1½–3¼	None	Yes
Bryan.....M	4,252	U	0.5	.....	.....	.....	7.3	I	LI	4–12	.....	2.0	Yes

Consumption		Number of Services		Number of Meters		Per Cent Metered		Meter Rates per 1,000 Gallons		Meters Owned by	Hydrants			Average Pressure lbs. per sq. in.	
Average Daily in 1,000 gals.	Per Capita	Domestic	Industrial	Domestic	Industrial	Domestic	Industrial	Max. Dom.	Min. Ind.		Number	Owned by	Aver. Rental each per year	Domestic	Fire
600	278	518	3	0	0	0	0	.....	.....	.....	75	M	None	73	73
60	71	275	3	275	3	100	100	40¢	1.5¢	H	41	M	.....	90	90
200	206	300	.....	60	.....	20	.....	40¢	.....	P	40	P	$20	110	110
125	36	732	.....	732	.....	100	.....	37¢	.....	M	93	M	None	80	85
350	88	750	50	200	40	27	80	25¢	25¢	M	41	M	.....	120	180
Unknown	.....	100	1	0	0	0	0	.....	.....	.....	25	M	.....	97	97
500	209	400	.....	.....	3	.....	.....	.....	.....	M	46	M	$10	65	86
25	19	150	.....	.....	.....	.....	.....	.....	.....	.....	85	.....	.....	50	90
.....	.....	100	.....	.....	.....	.....	.....	.....	.....	.....	19	.....	.....	100	100
250	69	700	.....	0	9	0	.....	.....	5¢	M	100	.....	.....	150	150
.....	.....	.....	.....	0	0	0	0	.....	.....	.....	.....	M	.....	75	75
350	80	925	25	875	25	95	100	30¢	12¢	H	115	M	.....	80	110
375	75	900	.....	350	.....	49	.....	.....	.....	.....	77	P	.....	65	65
.....	.....	500	.....	245	5	49	.....	35¢	4¢	H	53	M	.....	67	120
Unknown	.....	425	0	425	0	100	0	25¢	.....	M	68	.....	.....	90	90
60	32	350	10	350	10	100	100	75¢	20¢	H	72	M	None	65	88
216	144	315	1	16	0	5	0	40¢	.....	H	25	P	$60	55	55
560	373	1,100	25	1,060	25	96	100	33.3¢	10.7¢	M	177	M	$28.20	95	95
100	30	360	3	350	3	97	100	42¢	10¢	M	59	M	None	50	50
270	135	675	0	650	0	96	.....	20¢	.....	H	94	M	None	40	120
135	45	550	8	550	8	100	100	40¢	15¢	M	38	M	None	85	145
Unknown	.....	600	30	0	1	0	3	.....	12¢	M	31	M	$1.80	50	33
75	42	250	4	250	4	100	100	80¢	25¢	M	39	M	None	56	56
150	60	300	10	175	5	58	50	50¢	50¢	M	50	M	.....	45	88
50	42	90	.....	90	.....	100	.....	33¢	.....	H	36	M	.....	60	60
175	50	506	.....	505	.....	100	.....	25¢	25¢	M	84	M	$50	60	60
125	50	275	6	275	6	100	100	25¢	25¢	M	60	M	.....	55	55
100	42	350	8	325	8	93	100	35¢	25¢	M	43	M	.....	70	70
32	16	116	.....	110	.....	95	.....	35¢	35¢	M	39	M	.....	43	100
33	13	250	50	250	50	100	100	83¢	83¢	.....	77	M	None	55	70
50	36	105	4	105	4	100	100	25¢	15¢	H	40	M	.....	45	150
100	56	300	40	300	40	100	100	20¢	20¢	M	46	M	None	48	98
187	42	1,000	.....	600	.....	60	100	35¢	.....	M	58	M	.....	58	.....
60	43	.....	.....	.....	.....	98	98	25¢	20¢	H	31	M	.....	80	120
100	.....	400	5	300	5	75	100	35¢	22.5¢	M	75	M	None	53	60
270	91	490	.....	40	.....	8	.....	40¢	40¢	H	45	M	.....	50	75
800	178	700	100	550	100	79	100	.....	.....	M	125	M	.....	55	.....
300	63	892	.....	450	.....	51	.....	25¢	12.5¢	M	98	M	.....	60	100
30	10	168	5	168	3	100	60	30¢	30¢	M	30	M	$5	45	45
140	47	250	50	225	40	90	80	.....	25¢	M	45	M	.....	45	80
100	67	250	5	100	5	40	100	22.5¢	7.5¢	M	60	M	None	100	155
60	40	180	40	178	36	99	90	50¢	12.5¢	M	34	M	.....	40	125
60	.....	275	2	0	2	0	100	.....	25¢	.....	42	M	None	55	55
60	43	.....	.....	25	.....	.....	.....	25¢	.....	M	.....	.....	.....	.....	.....
150	60	375	25	375	25	100	100	35¢	35¢	M	59	MP	.....	45	100
15	15	120	6	120	6	100	100	50¢	50¢	M	19	M	None	50	50
70	28	507	2	487	2	96	100	45¢	25¢	M	50	M	None	25	75
50	36	250	50	250	50	100	100	50¢	20¢	M	37	M	$12.50	50	50
50	42	250	15	220	10	88	67	35¢	25¢	M	41	M	.....	58	63
200	100	525	5	40	5	8	100	14¢	.....	M	35	M	None	95	95
35	29	174	0	174	0	100	.....	50¢	.....	H	34	M	.....	75	75
8	7	48	0	48	0	100	0	$1	.....	H	29	M	.....	.....	70
Unknown	.....	11	.....	.....	.....	.....	.....	.....	.....	M	30	M	.....	.....	.....
90	68	300	10	260	10	87	100	30¢	30¢	H	38	M	.....	40	80
20	9	280	2	280	2	100	100	20¢	35¢	M	60	M	.....	50	150
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	.....	.....	10	52
40	16	34	.....	200	.....	.....	.....	.....	.....	.....	42	.....	.....	30	150
10	6	40	0	0	0	0	0	.....	.....	.....	29	M	None	60	80
40	29	80	15	80	.....	100	.....	75¢	20¢	M	36	M	.....	30	135
293	158	400	0	350	0	88	0	40¢	.....	H	56	M	None	40	60
23	17	140	.....	90	.....	64	.....	45¢	.....	MH	22	.....	.....	55	63
Unknown	.....	150	.....	150	.....	100	.....	.....	54¢	H	28	M	$24	65	83
18	13	125	.....	125	.....	100	.....	.....	.....	H	28	M	.....	65	65
400	89	694	2	691	2	99	100	20¢	20¢	H	118	M	None	65	83
50	22	400	.....	510	.....	99	.....	40¢	.....	P	15	P	$50	60	100
70	58	230	.....	240	.....	100	.....	30¢	7¢	H	36	M	.....	45	35
86	66	400	.....	0	15	0	.....	.....	7¢	M	43	M	None	50	75
100	93	220	10	220	10	100	100	40¢	40¢	H	33	M	None	55	55
400	82	1,250	50	1,150	50	92	100	75¢	10¢	M	110	M	.....	75	100
85	36	434	20	433	20	99	100	42¢	19¢	M	62	M	None	50	65
1,000	250	1,000	4	35	5	4	100	30¢	10¢	H	43	M	.....	60	60
450	105	850	.....	840	.....	99	.....	30¢	8¢	M	98	M	.....	70	140

Municipality Ownership of Water works	Population	Source		Storage	Filters	Sterilized	Distribution System			Pipe Sizes Inches		Pump Capacity m. g. d.	Main Supply Met-
		Type	Aver. Miles from City				Total Miles of Main	Kind of Pipe		Mains	Services		
								Mains	Services				
OHIO (Con.)													
Cadis.....M	2,084	U	0.3	R	No	No	7.5	I	G	4-12	¾-1¼	0.8	No
Carey.....M	2,488	U	0.5	RPp	.....	.....	7.3	I	LG	4-12	¾	1.0	No
Celina.....M	4,226	U	0.5	RPp	No	No	9.0	I	L	4-12	.....	1.0	No
Chardon.....M	1,500	U	0.5	R	No	No	7.0	I	G	4-8	¾	.....	...
Columbiana.....M	2,500	U	0.3	RT	No	No	7.5	I	G	4-12	¾-1	0.4	No
Columbus Grove.....M	1,802	U	0.0	Pp	.....	.....	5.0	I	L	4-10	.....	1.5	No
Corning.....M	1,560	S	0.3	R	.....	.....	2.3	I	G	4	.....	0.1	No
Covington.....M	2,100	U	0.1	Pp	No	No	7.0	I	GL	4-10	¾-1	1.4	No
Delta.....M	1,689	U	0.5	RPp	.....	.....	4.9	I	.....	4-10	.....	0.1	No
Dunkirk.....M	1,109	U	0.5	Pp	No	No	5.0	I	G	4-8	¾	0.2	No
Eaton.....M	3,210	SU	0.8	RPp	A	Ch	23.0	I	L	4-12	½	1.0	Yes
Fairport.....M	4,211	S	4.0	Pp	A	Ch	10.0	I	G	4-8	.....	.....	Yes
Forest.....M	1,183	U	0.3	T	.....	No	....	I	G	4-8	¾	0.2	No
Fredericktown.....M	1,100	U	0.3	T	No	No	....	.....	G	4-8	¾-1¼	1.1	No
Geneva.....M	3,081	S	3.5	R	O	Ch	15.0	I	G	6-12	½-2	0.8	No
Germantown.....M	1,827	U	0.6	T	No	No	9.0	I	L	6-10	¾-1¼	1.1	No
Gibsonburg.....M	2,000	U	0.3	RPp	No	No	5.0	.....	GL	4-8	.....	0.8	No
Granville.....M	1,550	U	0.5	Pp	.....	.....	6.0	I	G	4-6	¾	0.3	...
Greenfield.....M	4,344	U	0.2	T	.....	Ch	20.0	I	G	2-12	¾-1½	1.5	Yes
Greenwich.....M	1,356	U	0.1	RPp	No	.....	3.0	I	L	4-8	.....	1.4	No
Grove City.....M	1,400	U	0.3	T	.....	.....	.....	.....	.....	.....	.....	0.7	No
Hillsboro.....M	4,356	U	2.5	RPp	.....	.....	10.5	.....	G	3-10	.....	1.0	...
Holgate.....M	1,100	U	0.5	.....	.....	.....	4.5	I	G	4-8	.....	0.03	...
Huron.....M	2,318	S	0.3	Pp	O	Hy	6.0	I	G	4-8	.....	1.3	No
Jefferson.....M	2,994	S	2.0	RPp	A	No	7.0	I	G	4-8	¾-2	0.4	No
Lebanon.....	3,396	U	0.5	Pp	.....	.....	12.0	I	.....	4-12	.....	1.5	...
Lewisburg.....M	.....	U	0.3	T	No	No	6.0	I	G	4-10	¾-1¼	0.6	No
Lodi.....M	1,250	T	0.5	T	A	.....	.....	.....	G	2-8	¾	1.4	No
London.....P	4,080	U	0.3	RPp	No	No	12.8	I	G	4-14	¾-2	4.6	No
Louisville.....M	2,508	U	0.3	Pp	.....	.....	8.5	I	G	4-10	.....	1.0	No
Loveland.....P	.....	SU	0.5	RT	.....	Ch	17.5	I	.....	4-10	½-¾	1.0	No
Lowellville.....M	2,214	U	2.0	Pp	.....	.....	10.0	I	L	4-12	¾	0.4	Yes
Lynchburg.....M	923	U	1.5	RPp	No	No	3.5	I	G	2-8	.....	0.5	No
McConnelsville.....M	1,831	U	0.3	R	No	No	5.0	.....	.....	6-8	½-4	0.7	No
Marysville.....P	3,635	U	0.4	.....	.....	.....	12.0	I	GL	4-12	.....	2.0	No
Medina.....M	3,430	S	3.0	Pp	A	Ch	18.0	I	GLI	4-8	¾	0.9	No
Miamisburg.....M	4,383	U	0.5	.....	.....	.....	15.0	I	L	4-14	½-2	2.0	No
Milan.....M	1,721	U	....	R	.....	.....	2.3	I	.....	4-8	.....	1.3	...
Milford.....M	1,780	U	0.5	Pp	.....	.....	16.0	I	G	1-10	¾	1.8	No
Millersburg.....M	2,098	U	0.5	R	No	No	4.5	I	Wr L	4-10	¾-1	0.5	No
Minerva.....M	2,261	SU	0.2	Pp	O	.....	3.5	I	G	4-8	¾-1	0.4	No
Mingo Junction.....P	4,616	SU	0.5	R	.....	Hy	8.0	I	L	2-8	½-1	1.0	No
Minster.....M	1,583	U	0.1	RPp	No	No	5.5	I	.....	4-8	½-2	1.0	No
Monroeville.....M	1,152	S	2.5	Pp	No	No	5.0	I	LG	8	¾	2.0	No
Montpelier.....M	3,052	U	0.5	Pp	No	.....	6.5	I	LI	4-12	.....	1.0	No
Mt. Healthy.....M	3,100	SU	....	.....	.....	.....	11.5	I	.....	4-8	.....	.....	...
Murray.....M	1,386	U	0.3	RT	No	No	1.0	IC	G	4-6	.....	.....	No
Navarre.....M	1,357	U	1.0	Pp	.....	.....	5.0	I	G	4-10	.....	0.7	No
New Concord.....M	1,000	U	....	R	No	Ch	2.0	IW	I	2-8	.....	0.4	No
New Lexington.....M	3,157	U	0.5	RT	No	No	....	I	G	4-10	¾-1	1.2	No
New Richmond.....M	1,714	S	1.0	R	No	No	6.0	I St	I	4-10	.....	0.7	No
North Baltimore.....P	2,439	U	0.5	RPp	No	No	8.5	I	LG	4-12	¾	1.0	No
Oak Harbor.....M	1,800	U	0.0	RPp	.....	.....	7.0	.....	.....	4-10	.....	0.04	No
Oxford.....M	4,240	U	1.0	RT	.....	.....	12.0	I	L	4-10	½-2	1.2	Yes
Perrysburg.....M	2,429	S	....	Pp	.....	.....	6.5	.....	.....	4-8	.....	1.0	No
Plain City.....M	1,407	U	0.5	.....	.....	.....	5.5	I	L	4-10	.....	0.8	Yes
Pomeroy & Middleport...P	3,800	S	1.5	R	OA	Ch Hy	8.5	I St	GL	2-8	½	2.0	No
Port Clinton.....M	3,928	S	0.5	.....	O	Ch	9.8	I	LI	4-16	.....	1.0	No
Rittman.....M	2,000	U	0.5	RT	No	No	5.0	I	GL	4-8	¾-2	1.0	No
Rocky River.....M	2,500	S	0.0	Pp	A	Ch	18.0	I	L	4-12	¾-2	.....	No
Sabina.....M	1,514	U	0.5	Pp	.....	.....	4.0	I	GL	4-8	¾-2	0.3	Yes
Salineville.....M	2,700	U	1.0	R	No	No	7.0	I	G	4-6	¾	1.0	No
Scio.....P	1,100	U	1.5	Pp	.....	.....	5.5	I	GL	4-8	.....	1.0	No
Sebring.....M	3,541	S	3.0	RPp	O	Ch	4.0	I	GL	2-10	¾-2	2.8	No
Sycamore.....M	1,464	U	0.1	RPp	No	.....	3.5	I	.....	4-10	.....	.....	No
Tippecanoe.....M	2,446	U	0.5	None	No	No	10.0	I	G	4-10	¾-2	2.0	No
Utica.....M	1,729	U	1.0	R	No	No	8.0	I	Wr G	2-8	¾-¾	0.2	No
Versailles.....M	1,600	U	....	.....	No	No	5.0	I	L	4	¾	1.4	Yes
Waverly.....M	1,803	U	0.1	Pp	A	.....	7.0	I	.....	4-8	¾-1	0.8	No
Wellington.....M	2,245	S	0.2	RPp	A	Hy	6.0	.....	L	4-10	¾	1.4	Yes
Westerville.....M	3,200	S	0.5	Pp	A	.....	8.5	I	I	4-8	.....	0.4	...
West Milton.....M	1,207	U	0.6	RPpT	.....	Ch	3.5	I	G	4-8	¾	1.2	No
Wyoming.....M	2,323	U	0.5	R	.....	.....	18.0	I	L	4-10	.....	2.5	...

Consumption		Number of Services		Number of Meters		Per Cent Metered		Meter Rates per 1,000 Gallons		Meters Owned by	Hydrants			Average Pressure lbs. per sq. in.	
Average Daily in 1,000 gals.	Per Capita	Domestic	Industrial	Domestic	Industrial	Domestic	Industrial	Max. Dom.	Min. Ind.		Number	Owned by	Aver. Rental each per year	Domestic	Fire
50	24	655	.....	340	.....	52	.....	47¢	47¢	M	79	M	None	80	100
300	120	675	12	566	12	84	100	24¢	14¢	M	61	M	None	50	100
200	47	965	.....	.....	.....	.....	.....	.....	20¢	M	120	M	None	54	75
45	30	390	0	390	0	100	100	40¢	30¢	H	54	M	None	60	100
200	80	506	10	506	10	100	100	60¢	20¢	H	46	M	.....	60	60
150	83	400	5	240	5	60	100	30¢	10¢	M	44	M	None	60	100
Unknown	.....	9	.....	.....	.....	.....	.....	.....	.....	.....	23	.....	.....	110	110
75	36	538	.....	538	.....	100	.....	25¢	8¢	M	71	M	.....	67	67
100	59	400	.....	400	.....	100	.....	.....	.....	H	42	.....	None	45	100
65	59	182	3	182	3	100	100	40¢	40¢	H	35	M	None	53	125
250	78	1,078	.....	700	.....	65	.....	37.5¢	25¢	M	91	M	None	60	108
.....	.....	800	8	780	8	97	100	28¢	18¢	H	48	M	.....	60	60
10	9	52	0	52	0	100	.....	40¢	.....	H	.....	M	None	.....	.....
101	92	430	10	0	0	0	0	.....	.....	.....	41	M	None	78	78
400	130	950	.....	750	.....	79	.....	30¢	14¢	M	100	M	.....	80	80
13	7	92	.....	92	.....	100	.....	25¢	.....	M	77	M	None	63	63
150	75	410	1	410	1	100	100	.....	.....	M	63	M	None	48	100
100	65	450	.....	300	.....	67	.....	40¢	.....	H	38	M	None	95	95
1,000	230	700	456	700	456	100	100	30¢	4¢	M	80	M	None	65	150
60	44	125	.....	123	.....	99	100	25¢	12¢	.....	.....	.....	.....	38	100
20	14	100	0	100	0	100	0	30¢	30¢	M	.....	M	.....	.....	.....
.....	.....	946	.....	826	.....	87	.....	.....	.....	.....	75	.....	.....	.....	.....
.....	.....	225	3	152	.....	68	.....	25¢	25¢	H	19	M	$9	50	100
130	56	350	7	376	7	99	100	34¢	20¢	M	50	M	None	46	85
70	23	333	5	333	5	100	100	60¢	35¢	H	40	M	None	120	120
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	79	.....	.....	.....	.....
55	.....	268	.....	268	.....	100	.....	25¢	15¢	H	56	M	None	63	90
90	72	.....	1	.....	.....	.....	.....	40¢	15¢	M	.....	M	.....	60	60
800	195	1,050	.....	200	19	.....	.....	25¢	16¢	P	132	P	$30	43	90
125	50	600	10	.....	.....	0	0	.....	.....	.....	56	M	.....	35	80
60	.....	279	2	190	.....	69	.....	30¢	.....	P	28	P	.....	115	136
30	14	310	1	310	1	100	100	40¢	40¢	H	50	M	.....	70	70
60	65	210	0	36	0	17	0	25¢	25¢	H	22	M	$8	40	80
30	16	200	.....	60	.....	30	.....	.....	25¢	M	50	M	None	100	100
450	124	850	.....	40	.....	5	.....	25¢	7¢	P	128	P	$50	60	100
225	66	1,000	30	951	30	95	100	89¢	14¢	M	103	M	None	45	45
700	160	1,129	18	113	18	10	100	18¢	18¢	M	125	M	$25	70	120
60	35	180	.....	.....	.....	.....	.....	10¢	.....	M	28	.....	.....	48	80
200	112	472	.....	470	.....	100	.....	25¢	20¢	H	56	M	None	110	120
400	191	570	5	0	5	0	100	.....	10¢	M	52	M	.....	80	80
Unknown	.....	750	.....	400	.....	53	.....	.....	.....	H	29	M	.....	65	72
325	70	761	.....	567	.....	74	.....	45¢	.....	P	38	P	$75	150	150
125	79	190	10	190	10	100	100	30¢	12¢	H	96	.....	.....	60	100
175	152	350	.....	0	0	0	0	.....	.....	.....	41	M	.....	45	85
300	98	950	.....	870	.....	92	.....	10¢	15¢	M	90	M	None	45	100
80	26	591	.....	591	.....	100	.....	40¢	.....	.....	82	.....	.....	60	60
48	35	225	.....	0	.....	0	.....	.....	.....	.....	18	M	None	96	100
50	37	325	.....	.....	2	.....	.....	.....	.....	M	50	M	.....	70	70
50	50	175	.....	175	0	100	.....	50¢	.....	M	20	M	.....	88	88
30	10	300	.....	300	.....	100	.....	80¢	80¢	M	.....	M	None	60	.....
120	70	280	9	138	4	49	100	25¢	25¢	M	50	M	None	80	80
150	62	340	17	340	17	100	100	70¢	22¢	P	82	.....	.....	45	80
650	300	350	.....	350	.....	100	.....	20¢	.....	M	42	M	.....	50	100
450	106	754	.....	580	.....	77	.....	20¢	12.5¢	M	79	M	.....	50	.....
125	51	482	3	482	.....	100	.....	10¢	.....	H	62	M	None	50	.....
.....	.....	300	.....	.....	4	.....	.....	.....	.....	.....	33	M	None	45	130
475	125	1,500	4	800	4	53	100	75¢	30¢	P	76	P	$75	60	120
750	190	1,763	6	1,042	6	100	100	20¢	9.3¢	H	87	M	.....	60	75
110	55	500	0	500	0	100	0	30¢	.....	H	66	M	.....	50	50
300	120	700	3	700	3	100	100	25¢	15¢	H	250	M	None	65	65
60	40	265	20	265	20	100	100	25¢	25¢	H	29	M	None	50	70
Unknown	.....	550	.....	30	.....	6	.....	40¢	15¢	H	56	M	.....	100	120
50	45	267	.....	255	.....	95	.....	70¢	40¢	P	39	P	.....	100	100
750	212	900	40	200	40	22	100	42¢	8¢	H	55	M	$32	60	125
450	308	174	.....	45	1	26	.....	40¢	.....	H	29	M	.....	40	100
400	163	700	69	700	69	100	100	14¢	9¢	H	55	M	$50	65	100
40	23	300	.....	300	.....	100	.....	33.3¢	33.3¢	H	36	M	.....	65	65
150	94	350	50	50	.....	14	.....	27¢	13¢	M	50	M	None	60	100
40	22	150	.....	125	.....	83	.....	25¢	15¢	M	58	M	None	80	90
160	71	460	.....	449	.....	97	.....	50¢	5¢	M	61	M	None	40	100
200	63	725	.....	725	.....	100	.....	33¢	23¢	H	55	M	.....	47	100
65	54	380	2	370	2	97	100	15¢	15¢	M	32	M	None	60	60
600	258	700	.....	700	.....	100	.....	34¢	20¢	.....	80	M	None	110	110

Municipality Ownership of Water works	Population	Source		Storage	Filters	Sterilised	Distribution System			Pipe Sizes Inches		Pump Capacity m. g. d.	Main Supply Metered
		Type	Average Miles from City				Total Miles of Main	Kind of Pipe					
								Mains	Services	Mains	Services		
OKLAHOMA													
Afton M	1,600	U	0.0	RPp	No	No	5.0	I	G	2-8	1-1¼	1.1	No
Altus M	4,522	SU	1.0	RPp	A	Ch	18.0	I	G	4-10	1-4	3.0	No
Antlers M	2,000	S	1.5	RPp	No	No	6.0	I St	G	4-8	1-2	0.6	No
Bixby M	1,249	U	0.3	T	No	No	2.0	I	G	.....	.....	.....	No
Boswell M	1,500	U	0.0	RT	No	Ne	3.0	I	G	4-8	¾	0.9	...
Britton M	.....	U	....	RPp	No	.....	5.0	I	G	.....	.....	.....	No
Broken Arrow M	2,086	U	4.5	RPp	No	No	10.0	I	I	4-8	.....	1.4	...
Chandler M	2,226	SU	0.3	RPp	No	No	8.0	I	G	4-10	¾-1½	2.0	No
Checotah M	2,390	S	6.0	R	A	Hy	9.0	I	I	4-12	1-2	1.1	Yes
Cherokee M	2,017	U	0.5	Pp	.....	.....	4.0	I	GL	2-12	.....	2.2	No
Claremore M	3,435	S	4.5	RPp	.....	.....	12.0	I	G	4-12	.....	0.7	...
Cleveland M	2,717	U	0.8	RPp	No	No	6.0	I	G	4-8	.....	0.02	Yes
Collinsville M	3,500	S	2.0	RT	A	Ch	8.0	I St	GL	2-8	¾	0.7	No
Comanche M	1,427	U	0.0	RPp	No	No	4.0	.....	G	4-8	¾	0.8	No
Covington M	1,500	U	0.5	T	No	No	5.0	I	G	2-6	¾	0.4	No
Coweta M	1,800	U	2.5	RPp	No	.....	10.0	I	G	6	4	.....	No
Custer M	1,000	U	0.1	RT	No	No	3.3	.....	G	4-8	.....	1.1	No
Davis M	1,609	U	0.3	RPp	No	No	4.0	I	G	4-8	.....	0.9	No
Edmond M	2,452	U	0.1	RPp	....	.....	8.0	I	I	4-8	.....	1.2	No
Gage M	924	U	0.5	RPp	No	No	3.0	I	I	4-8	¾-2	0.8	No
Geary M	1,065	U	4.5	Pp	No	No	6.0	I	G	4-6	2	0.5	No
Grandfield M	.....	U	7.0	RPp	.....	No	14.0	I St	G	5-8	1-2	0.4	Yes
Haileyville M	2,067	S	2.0	Pp	.....	.....	8.0	I	.....	4-8	.....	.....	...
Hartshorne M	3,480	S	1.0	Pp	No	.....	10.5	I	.....	¼-8	¾-8	1.3	No
Heavener M	3,000	S	3.2	RT	No	.....	14.0	I	G	2-8	.....	0.8	Yes
Hennessy M	1,310	U	2.0	Pp	No	No	4.0	I	G	4-6	1-2	.....	No
Hinton M	1,000	U	0.8	Pp	No	No	5.0	I	G	2-6	.....	0.1	No
Kingfisher M	2,447	U	0.5	RPp	.....	Ch	6.0	I	.....	4-10	¾-2	2.0	No
Kiowa M	1,200	U	0.0	R	No	No	9.0	IG	G	2-8	1-2	.....	No
Lehigh M	900	U	2.0	Pp	No	.....	3.0	I St	G	2-6	.....	.....	No
Lexington M	860	U	0.0	Pp	No	No	3.0	I	.....	¼-1¼	.....	1.2	No
Madill M	3,000	S	6.0	RPpT	A	Ch	17.0	I	G	4-10	¾	2.2	...
Mangum M	3,405	U	1.0	Pp	.....	.....	12.0	I	.....	4-8	.....	1.0	No
Marietta P	1,977	U	0.0	RPp	No	No	5.0	I	G	4-8	1-¾	0.9	No
Marlow M	3,000	U	0.3	RPp	No	No	....	I	G	4-8	1-1¼	0.7	No
Newkirk M	2,533	U	0.8	RPp	.....	.....	12.0	I	L	4-8	.....	0.5	Yes
Okustee M	1,391	U	0.2	RPp	No	No	1-5	I	G	4-8	.....	0.2	...
Poteau M	2,679	S	1.0	R	O	Ch	....	.....	.....	6-10	¾	2.0	No
Pryor M	2,500	S	9.0	R	A	Ch	14.0	I St	G	.....	.....	1.4	No
Quinton M	2,000	S	5.5	R	No	No	14.0	IG	G	2-6	¾	None	No
Ringling M	1,200	U	....	T	....	.....	8.0	I	I	4-8	¾	.....	...
Roff M	1,200	U	0.1	RPp	No	No	4.0	I	G	2-6	1-1	.....	No
Sallisaw M	2,255	S	4.0	RPp	No	Ch	4.4	I	G	2-8	.....	.....	No
Shamrock M	1,500	U	0.0	RPp	No	No	4.0	I	.....	4-6	1-1¼	.....	No
Stroud M	3,500	U	0.3	RT	No	No	5.0	I St	G	4-8	½-¾	.....	No
Sulphur M	4,500	U	1.0	RPp	No	No	5.0	I	G	4-12	.....	0.6	No
Tahlequah M	2,271	S	2.5	R	.....	.....	10.0	I	I	2½-10	.....	0.4	No
Thomas M	1,223	U	....	RPp	.....	.....	2.0	I	G	4-8	.....	1.0	No
Tishomingo M	1,871	S	0.0	Pp	O	.....	5.0	I	IG Wr	4-8	¾	1.4	...
Weatherford M	1,929	U	....	RPp	No	No	2.5	I	G	4-10	.....	.....	Yes
Welcetka M	2,500	S	2.5	T	A	Ch	....	I	GL	1-12	1-2	1.1	Yes
Wilburton P	2,226	S	1.0	Pp	A	Ch	5.0	I	G	4-10	.....	1.7	Yes
Woodward M	4,500	U	3.3	RT	.....	.....	9.0	I	G	4-16	¾-2	0.2	No
Wynnewood M	2,200	U	2.0	Pp	No	Ch	6.0	I	G	4-8	.....	0.5	...
OREGON													
Amity M	600	U	3.1	R	No	No	....	.....	G	2-8	2-4	.....	No
Bandon M	1,803	U	2.0	R	No	Ch	12.0	W St	G	4-14	.....	0.4	No
Brownsville M	1,000	U	0.3	RT	.....	.....	5.0	IW	I Cl	4-6	¾	.....	No
Canby M	1,418	U	0.0	T	No	Ch	5.0	I	G	1-6	¾	0.2	No
Cottage Grove M	2,500	S	20.0	R	No	No	20.0	WC	G	4-12	.....	None	No
Dallas M	2,701	S	7.0	R	.....	.....	19.8	.....	G	1-12	.....	.....	No
Enterprise M	3,000	U	3.5	R	No	No	16.3	W St	.....	4-14	.....	.....	No
Falls City M	1,100	SU	4.0	R	O	.....	10.0	W	G	2-10	2-8	.....	No
Gladstone M	2,000	S	....	R	No	No	4.0	W St	G	1-8	¾	0.6	No
Hermiston M	900	U	2.0	R	No	Ch	6.5	W St	G	4-12	¾-1	0.4	No
Hillsboro P	2,468	S	18.0	R	No	No	30.0	W St	St	2-12	½-¾	None	Yes
Independence P	2,000	U	0.2	Pp	No	No	7.0	I St	G	2-6	¾-2	3.0	No
Milton M	1,840	S	1.5	.....	No	No	55.0	W St	G	4-12	.....	2.3	No
Milwaukee M	1,500	S	2.0	.....	.....	.....	9.0	IG	G	2-8	¾	.....	Yes
Myrtle Point M	1,250	U	1.0	R	No	Ch	5.0	St	G St	2-6	¾-4	0.7	No
Newberg M	2,566	U	5.0	R	No	No	27.0	I WG St	G	¾-10	½-¾	0.6	No
Newport M	1,200	S	....	R	No	Ch	12.0	W	G	4-10	.....	.....	No
Ontario M	2,500	S	1.0	RPpT	A	Ch	28.5	IW	G	3-12	.....	1.0	No
Oswego P	1,818	U	0.5	R	No	No	....	W	G	2-6	.....	0.6	No
Prineville P	1,042	U	0.0	Pp	No	No	7.9	St	.....	¾-6	¾-1	0.4	No

Consumption		Number of Services		Number of Meters		Per Cent Metered		Meter Rates per 1,000 Gallons		Meters Owned by	Hydrants			Average Pressure lbs. per sq. in.	
Average Daily in 1,000 gals.	Per Capita	Domestic	Industrial	Domestic	Industrial	Domestic	Industrial	Max. Dom.	Min. Ind.		Number	Owned by	Aver. Rental each per year	Domestic	Fire
60	38	300	20	15	20	5	100	$1.00	50¢	M	20	M	None	55	70
750	166	800	.....	800	.....	100	.....	50¢	.....	M	80	M	$45	70	120
50	25	330	4	200	4	31	100	20¢	15¢	M	47	M	.....	65	100
15	12	150	1	125	1	83	100	30¢	10¢	M	20	M	.....	48	.....
50	33	120	10	0	0	0	0	.....	.....	.....	30	M	.....	80	80
40	.....	275	.....	225	.....	82	.....	45¢	.....	M	.....	.....	.....	45	.....
100	48	375	.....	325	.....	87	.....	30¢	.....	.....	42	M	.....	60	110
125	56	500	.....	500	.....	100	.....	$1.00	30¢	M	36	M	None	65	150
150	65	670	4	670	4	100	100	70¢	70¢	M	52	M	.....	68	102
400	197	.....	.....	62	.....	.....	.....	75¢	15¢	M	36	M	.....	55	125
300	88	400	.....	200	.....	50	.....	30¢	12¢	.....	83	.....	.....	50	120
10	4	500	.....	500	.....	100	.....	75¢	25¢	M	22	M	.....	45	80
175	50	325	8	300	8	92	100	40¢	.....	M	45	M	.....	50	100
50	35	327	4	180	4	55	100	25¢	10¢	M	24	M	None	65	110
50	33	170	0	160	0	94	0	25¢	25¢	M	18	M	None	47	58
60	33	284	.....	250	.....	88	.....	30¢	30¢	M	20	M	.....	50	50
75	75	85	.....	80	.....	94	.....	50¢	.....	H	22	M	.....	56	100
75	47	350	.....	200	.....	60	100	30¢	15¢	M	40	M	None	60	125
250	102	760	.....	760	.....	100	.....	25¢	18¢	M	59	M	.....	42	109
75	81	120	20	120	20	100	100	25¢	15¢	M	22	M	.....	44	150
Unknown	.....	300	4	286	4	95	100	$1.25	12¢	H	26	M	.....	55	125
225	.....	400	30	220	30	55	100	$1.00	25¢	M	34	M	None	42	60
120	58	340	.....	340	.....	100	.....	40¢	15¢	M	59	M	.....	80	80
Unknown	.....	.....	.....	.....	.....	.....	.....	.....	.....	M	48	M	.....	65	83
300	100	600	.....	450	.....	75	.....	50¢	.....	M	44	M	None	85	103
50	38	.....	.....	.....	.....	.....	.....	$1.00	15¢	M	31	M	.....	47	75
25	25	100	.....	80	.....	80	.....	$1.00	.....	M	27	M	.....	55	55
250	102	450	.....	450	.....	100	.....	.....	.....	M	50	M	.....	50	125
5	4	78	6	3	6	4	100	$1.00	50¢	M	18	M	.....	55	55
40	45	125	3	125	3	100	100	60¢	20¢	H	26	M	None	50	65
30	35	200	.....	120	.....	95	.....	50¢	25¢	M	20	M	None	70	70
.....	.....	400	.....	375	.....	94	.....	$1.00	10¢	.....	63	M	.....	85	85
900	264	650	.....	300	.....	46	.....	42¢	20¢	M	81	M	.....	35	110
70	35	470	4	390	4	83	100	95¢	47¢	P	46	P	$6.00	50	113
140	47	460	.....	460	.....	100	.....	55¢	.....	M	52	M	None	40	65
350	138	633	.....	633	.....	100	.....	50¢	15¢	M	106	M	$44.50	60	60
14	10	25	3	22	3	88	100	$1.00	30¢	M	18	M	.....	44	60
600	224	600	.....	450	.....	75	.....	.....	.....	M	59	M	None	100	120
300	120	500	50	300	50	60	100	$1.00	20¢	M	75	M	.....	65	125
60	30	218	8	218	8	100	100	50¢	10¢	M	31	M	.....	100	.....
.....	.....	.....	.....	200	10	.....	.....	$1.50	$1.00	M	75	M	.....	76	.....
20	17	200	2	45	1	23	50	40¢	30¢	M	20	M	.....	40	65
200	89	450	10	430	10	96	100	45¢	13.5¢	M	43	M	.....	40	100
100	67	4	.....	0	.....	0	.....	$1.00	50¢	M	18	M	None	47	150
125	36	300	50	280	50	93	100	62.5¢	13¢	M	27	M	None	53	.....
800	176	800	0	100	.....	13	.....	.....	.....	M	65	M	.....	127	127
200	88	419	.....	203	.....	49	.....	50¢	.....	M	80	M	.....	60	.....
20	16	.....	.....	.....	.....	75	75	50¢	30¢	M	26	M	.....	70	100
500	267	344	.....	275	.....	80	.....	.....	.....	M	23	M	.....	50	120
200	104	500	6	350	6	70	100	.....	.....	M	23	M	.....	49	125
150	60	500	15	500	15	100	100	40¢	10¢	M	27	M	.....	75	157
200	90	500	5	450	5	90	100	75¢	10¢	M	50	M	.....	80	200
450	100	864	15	836	15	97	100	33.3¢	7¢	M	78	M	.....	75	120
125	57	250	10	200	10	80	100	30¢	15¢	M	34	M	None	70	120
42	70	135	0	135	0	100	0	40¢	25¢	M	31	M	$36	80	80
200	111	600	.....	15	.....	3	.....	24¢	6¢	M	143	M	.....	45	55
150	150	400	.....	.....	.....	.....	.....	.....	.....	.....	13	M	.....	50	70
75	53	.....	24	.....	0	.....	0	.....	.....	.....	50	M	$20	35	35
500	200	450	1	0	1	0	100	.....	18¢	M	32	M	None	92	85
300	111	827	.....	627	.....	76	90	30¢	15¢	P	61	M	.....	85	85
.....	.....	500	20	120	10	24	50	22¢	4.4¢	H	43	M	.....	85	100
Unknown	.....	250	30	0	0	0	0	.....	.....	.....	21	M	.....	95	190
4	2	417	2	0	1	0	50	.....	27¢	M	5	M	.....	85	85
40	45	100	28	100	28	100	100	25¢	25¢	H	18	M	.....	75	75
1,200	488	950	.....	850	.....	90	.....	33.3¢	10¢	P	54	P	$3.50	80	80
250	125	400	72	400	27	100	38	20¢	20¢	P	33	P	$24	35	90
600	318	470	50	0	0	0	0	.....	.....	.....	36	M	50¢	32	60
48	32	550	3	550	3	100	100	67¢	67¢	M	71	M	.....	93	93
120	96	380	.....	25	.....	8	.....	.....	.....	M	48	M	.....	110	110
300	117	800	12	800	12	100	100	25¢	12.5¢	H	64	M	.....	90	90
250	208	.....	24	.....	24	.....	100	50¢	10¢	M	40	M	None	80	.....
170	68	440	1	420	1	95	100	.....	12¢	M	54	M	.....	45	55
150	83	300	2	60	2	20	100	67¢	27¢	P	2	P	None	60	.....
50	48	333	9	166	9	50	100	25¢	20¢	P	46	M	.....	40	100

Municipality Ownership of Water works	Population	Source		Storage	Filters	Sterilized	Distribution System			Pipe Sizes Inches		Pump Capacity m. g. d.	Main Supply Metered
		Type	Aver. Miles from City				Total Miles of Main	Kind of Pipe		Mains	Services		
								Mains	Services				
OREGON (Con.)													
Rainier....M	1,287	S	2.0	R	.....	.....	6.0	St	G	4-8	¾	.....	No
Reedsport....M	2,250	S	7.0	R	No	No	6.0	W	G	4-8	¾	None	No
Roseburg....P	4,381	S	5.0	R	A	Ch	35.0	IW St	G	2-16	¾-4	1.1	No
St. Helens....M	2,800	SU	10.0	R	No	Ch	10.0	W	G	10	1½-3	None	No
Seaside....M	3,000	S	....	RT	No	Ch	20.0	W St	G St	.....	½-¾	.....	Yes
Silverton....M	2,251	S	5.0	R	No	Ch	16.0	.....	G	1-12	.....	1.4	No
Stayton....M	1,200	S	5.0	None	No	No	5.0	I St	G	2-12	¾	1.6	No
Tillamook....M	2,500	S	6.0	None	No	No	5.0	St	G	4-10	½-¾	.....	...
Union....M	1,732	S	2.5	None	No	No	5.0	I	G	2-8	¾	.....	No
Vale....M	900	U	0.3	R	No	Ch	15.0	I	G	4-6	¾	0.9	Yes
Wallowa....M	1,672	S	3.0	.....	.....	.....	....	.....	.....	4-12	.....	.....	...
Woodburn....M	2,000	U	0.0	T	No	No	2.0	W	G	2-8	½-2½	0.3	No
PENNSYLVANIA													
Abington....P	.....	S	....	PpR	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Albion....M	1,500	U	5.0	R	No	No	10.0	IW	G	4-8	.....	.....	No
Aldan....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Aliquippa....M	3,300	U	0.3	Pp	No	No	1.5	I	L	4-10	½-¾	2.3	No
Annville....P	2,517	U	1.5	R	No	Ch	6.0	I	G	2-8	.....	0.4	No
Apollo....P	4,000	S	1.0	R	O	Hy	10.0	I	L	4-16	½-¾	2.5	No
Avis....P	1,092	S	6.0	....	No	Ch	6.0	I	G	1½-12	½-¾	None	No
Avonmore....M	1,500	U	0.5	R	No	No	5.0	I	G	4-8	½	0.03	No
Baldwin....P	4,928	S	....	.....	SoA	Hy	....	I	GL	2-24	½-4	.....	No
Bath....M	1,401	S	2.0	R	.....	.....	4.0	I	GL	4-6	.....	.....	No
Beaver....M	4,500	U	0.3	R	No	....	10.0	I	L	4-10	.....	2.4	No
Beaver Meadow....P	1,700	U	0.3	R	No	No	2.0	I	G	1-4	¾-1	None	No
Bedford....M	3,000	....	1.5	R	No	No	10.0	I	G	4-8	.....	None	No
Bellefonte....M	3,996	U	0.3	R	No	No	10.0	I	G	4-12	.....	5.3	No
Berlin....P	2,500	U	4.0	R	No	No	5.0	I St	L	4-8	½-1	0.3	No
Bethel....P	2,406	S	....	.....	SoA	Hy	....	I	GL	2-24	½-4	.....	No
Boyertown....M	3,189	U	....	R	No	No	5.5	.....	.....	4-12	.....	.....	...
Brackenridge....M	4,987	S	0.3	R	O	No	4.5	I	GB	4-20	¾-8	5.0	No
Brentwood....P	1,695	S	....	.....	SoA	Hy	....	I	GL	2-24	½-4	.....	No
Bridgeville....P	3,500	S	....	.....	SoA	Hy	....	I	GL	2-24	½-4	.....	No
Brockwayville....P	2,369	U	5.0	RT	No	No	6.0	I	G	4-12	¾-2	None	No
Bryn Athyn....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Canton....P	2,154	S	5.5	R	.....	.....	10.0	I	L	4-12	.....	15.0	No
Carrolltown....M	1,350	U	1.0	R	No	No	2.0	I	GL	4-6	¾-1¼	0.04	No
Castle Shannon....P	2,353	S	....	.....	SoA	Hy	....	I	GL	2-24	½-4	.....	No
Centralia....P	2,336	U	3.0	R	No	No	4.0	.....	.....	14	.....	1.4	No
Christiana....P	1,100	U	2.5	R	No	No	4.8	I	IL	4-8	¾-1½	.....	...
Clifton Heights....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Cochranton....M	.....	U	1.3	RPp	.....	....	4.0	.....	.....	4-6	.....	.....	No
Collier....P	4,651	S	....	.....	SoA	Hy	....	I	GL	2-24	½-4	.....	No
Collingdale....P	3,834	S	3.0	.....	A	Ch	8.0	I Wr Cl	GL	2-8	¾-3½	.....	No
Colwyn....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Conneaut Lake....M	500	U	0.3	T	No	No	1.8	I	G	4-6	.....	.....	No
Coplay....P	2,845	SU	3.5	R	.....	....	3.8	I	GL	4-10	.....	1.0	...
Coudersport....P	2,836	U	3.0	R	No	No	21.0	I	LI	3-8	.....	0.1	No
Cresson....M	2,170	S	4.0	None	No	No	4.0	I St	G	¾-6	¾	.....	Yes
Cressona....M	2,400	U	4.0	R	No	No	13.0	I	.....	2-8	¾-2	.....	Yes
Dallas....P	650	U	1.5	RPpT	No	No	6.5	I St	G St	1½-6	.....	0.1	No
Dallastown....P	2,124	SU	0.5	R	A	....	6.5	I	G	2-8	¾-6	.....	No
Dalton....P	767	U	0.8	R	No	No	5.0	I	G	4-10	¾-1¼	0.2	No
Dawson....M	.....	....	1.0	R	.....	....	3.0	I	G	4-10	.....	0.045	No
Dillsburg....P	950	U	5.0	R	No	No	6.0	I	G	4-8	¾	None	No
Doylestown....M	3,837	U	1.0	RPp	.....	.....	10.5	I	LG	3-12	.....	0.3	...
Duncannon....P	1,679	SU	2.0	R	No	No	7.5	I	G	2-8	¾-2	None	No
Dushore....P	813	S	2.3	R	No	No	7.0	I	L	4-12	.....	1.0	No
East Bangor....M	1,500	U	4.0	R	No	No	8.0	I	G	3-8	½-1	None	No
East Lansdowne....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Easttown....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
East Whiteland....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Eddystone....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Edgewood....P	3,181	S	....	RPpT	A	Ch	7.0	I	LI	4-42	½-12	.....	...
Eldred....P	1,093	U	4.0	R	No	No	9.0	I	G	3-6	¾	.....	No
Elizabethtown....P	3,319	SU	0.5	R	O	Ch	7.3	I	LI	4-8	¾	1.4	No
Elkland....M	2,000	U	3.0	R	No	No	5.3	I	G	3-10	.....	0.3	No
Emlenton....P	1,025	S	0.5	R	A	No	8.0	I	I	3-8	.....	0.4	...
Emporium....P	3,036	U	4.0	R	No	No	17.4	I	.....	4-12	.....	1.0	...
Evans City....M	1,500	S	0.3	R	O	....	3.0	I	G	4-6	½-2	0.1	No
Factoryville....P	836	S	4.0	.....	.....	.....	12.0	I	I	4-10	.....	.....	No
Falls Creek....M	1,364	S	6.0	RPp	A	Ch	8.0	I	G	4-12	.....	0.07	No
Fleetwood....M	1,752	U	....	R	No	No	4.0	I	G	4-10	.....	None	No
Flemington....P	1,000	S	3.0	.....	No	Ch	....	.....	.....	.....	.....	None	...
Folcroft....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...

Consumption		Number of Services		Number of Meters		Per Cent Metered		Meter Rates per 1,000 Gallons		Meters Owned by	Hydrants			Average Pressure lbs. per sq. in.	
Average Daily in 1,000 gals.	Per Capita	Domestic	Industrial	Domestic	Industrial	Domestic	Industrial	Max. Dom.	Min. Ind.		Number	Owned by	Aver. Rental each per year	Domestic	Fire
153	119	400	40	300	40	75	100	67¢	11¢	M	35	M	.....	90	90
Unknown	.....	429	10	0	2	0	20	.....	.....	H	18	M	.....	68	68
1,000	229	2,300	9	2,300	9	100	100	$1.20	$1.20	P	62	M	$30	98	98
300	107	825	75	0	2	0	3	.....	10¢	.....	140	M	None	80	80
735	245	1,500	0	50	0	3	0	25¢	8¢	M	118	M	.....	60	60
2,000	890	1,000	.....	450	.....	45	100	$2.00	$2.00	MH	54	M	None	70	100
Unknown	.....	140	8	0	0	0	0	.....	.....	.....	22	M	.....	60	110
Unknown	.....	800	25	0	0	0	0	.....	.....	.....	50	M	.....	90	90
Unknown	.....	304	.....	0	0	0	0	.....	.....	.....	25	M	.....	45	95
.....	.....	200	.....	150	.....	75	.....	50¢	10¢	.....	29	M	None	65	65
.....	.....	150	50	0	0	.....	.....	.....	.....	.....	37	.....	.....	75	.....
Unknown	.....	500	13	475	13	95	100	25¢	15¢	M	27	M	$24	58	58
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	107	P	$60	60	60
25	17	400	5	400	5	100	100	$1.00	.....	H	34	M	None	60	60
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	14	P	$60	60	60
300	170	600	10	600	10	100	100	25¢	6¢	M	26	M	.....	80	125
Unknown	.....	603	5	254	5	42	100	30¢	10¢	H	16	P	$20	52	65
225	56	1,040	5	1,040	5	100	100	67¢	12¢	P	44	M	.....	140	140
Unknown	.....	380	1	0	1	0	100	.....	2¢	P	14	P	None	140	140
28	19	275	3	275	3	100	100	50¢	25¢	M	24	M	None	93	97
.....	.....	.....	.....	.....	.....	100	100	34¢	14¢	P	6	P	$50	145	145
Unknown	.....	308	.....	.....	8	.....	.....	.....	40¢	M	25	M	.....	85	85
1,200	266	1,500	0	0	0	0	0	.....	.....	.....	75	M	.....	100	100
Unknown	.....	287	7	0	3	.....	43	.....	13¢	P	9	P	None	90	90
100	33	550	100	550	100	100	100	40¢	20¢	.....	45	M	.....	65	140
2,000	500	1,245	80	60	.....	5	.....	20¢	5¢	M	71	M	None	85	105
120	48	411	4	51	1	12	25	25¢	15¢	P	28	P	$32.10	90	90
.....	.....	.....	.....	.....	.....	100	100	34¢	14¢	P	0	.....	.....	145	145
.....	.....	600	.....	.....	.....	.....	.....	.....	.....	.....	150	.....	.....	.....	75
450	90	800	5	760	5	95	100	55¢	14¢	M	45	M	$25	94	94
.....	.....	.....	.....	.....	.....	100	100	34¢	14¢	P	39	P	$50	145	145
.....	.....	.....	.....	.....	.....	100	100	34¢	14¢	P	30	P	$50	145	145
Unknown	.....	600	10	0	2	0	20	.....	.....	P	28	M	$40	65	65
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	3	P	$60	60	60
1000	464	.....	.....	.....	.....	100	100	34¢	14¢	P	79	P	.....	80	80
50	37	250	0	10	0	4	.....	$1.00	.....	M	30	M	.....	20	20
.....	.....	.....	.....	.....	.....	100	100	34¢	14¢	P	28	P	$50	145	145
1,000	430	500	10	10	.....	2	.....	40¢	14¢	P	15	P	$25	.....	.....
140	127	240	0	0	0	0	0	.....	.....	.....	22	P	.....	70	70
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	25	P	$60	60	60
12	.....	.....	.....	.....	.....	.....	.....	16¢	15¢	.....	20	M	.....	100	100
.....	.....	.....	.....	.....	.....	100	100	34¢	14¢	P	0	.....	.....	145	145
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	29	P	$60	60	60
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	9	P	$60	60	60
5	10	104	1	104	1	100	100	75¢	75¢	H	17	M	None	43	43
37	13	103	.....	.....	6	.....	.....	.....	.....	.....	28	.....	.....	70	125
200	71	700	10	0	10	0	100	.....	3¢	P	73	P	.....	47	105
150	60	450	2	450	2	100	100	40¢	30¢	MH	24	M	.....	85	85
130	54	600	.....	600	.....	100	.....	.....	.....	.....	34	.....	.....	.....	130
85	130	225	0	0	0	0	0	.....	.....	.....	1	P	.....	40	.....
.....	.....	.....	.....	487	.....	.....	.....	25¢	.....	P	43	.....	$10	.....	.....
30	39	150	1	135	1	90	100	50¢	25¢	P	21	P	$20	60	70
8	.....	160	0	160	0	100	0	60¢	30¢	H	29	M	.....	200	.....
Unknown	.....	325	5	130	5	40	100	50¢	20¢	P	30	P	$20	87	87
300	78	650	.....	0	6	0	.....	.....	.....	.....	100	M	.....	68	68
Unknown	.....	500	.....	100	.....	20	.....	15¢	15¢	P	22	P	$20	50	60
75	92	120	1	6	1	5	100	.....	.....	.....	26	P	$25	110	130
100	67	.....	.....	.....	.....	.....	.....	.....	.....	.....	20	M	None	.....	.....
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	11	P	$60	60	60
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	28	P	$60	60	60
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	0	.....	$60	60	60
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	20	P	$60	60	60
.....	.....	.....	.....	.....	.....	100	100	32¢	11¢	PH	.....	P	.....	.....	.....
Unknown	.....	280	.....	0	.....	0	.....	.....	.....	.....	30	P	.....	.....	100
170	51	600	.....	525	.....	88	.....	.....	.....	.....	45	.....	.....	70	70
Unknown	.....	325	.....	300	.....	92	.....	50¢	10¢	M	36	M	.....	110	110
90	88	272	4	125	3	46	75	50¢	20¢	M	25	P	$12.50	87	87
60	20	689	75	689	75	100	100	81¢	27¢	P	43	P	$50	85	85
100	67	.....	.....	375	3	.....	.....	45¢	20¢	H	32	M	.....	145	145
Unknown	.....	171	.....	.....	.....	.....	.....	.....	.....	.....	16	P	$15	70	.....
50	37	280	9	280	9	100	100	35¢	15¢	H	36	M	None	80	80
50	20	396	23	0	0	0	0	.....	.....	.....	28	M	$20	75	75
.....	.....	210	.....	.....	.....	.....	.....	.....	.....	.....	12	P	$15	100	.....
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	1	P	$60	60	60

Municipality Ownership of Water works	Population	Source Type	Source Aver. Miles from City	Storage	Filters	Sterilized	Distribution System Total Miles of Main	Distribution System Kind of Pipe Mains	Distribution System Kind of Pipe Services	Pipe Sizes Inches Mains	Pipe Sizes Inches Services	Pump Capacity m. g. d.	Main Supply Metered
PENNSYLVANIA (Con.)													
Freeport.....P	2,800	S	0.3	R	O	Ch	10.0	I	G	4-10	¾	2.0	Yes
Gallitsin.....P	4,200	SU	1.5	R	No	No	8.0	I St	G	1-6	½	0.2	No
Glenolden.....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-6	.....	...
Greentree.....P	1,043	S	....	.....	SoA	Hy	....	I	GL	2-24	½-4	.....	No
Grove City.....M	4,944	U	0.5	R	No	No	10.0	I	G	4-8	¾-1	.....	...
Hamburg.....P	2,764	S	3.0	R	No	No	3.0	I	G	2-8	¾-¼	.....	No
Hatboro.....P	1,500	U	0.1	Pp	No	Ch	5.0	I	G	6	¾-4	0.2	No
Hatfield.....M	1,000	U	0.3	Pp	No	No	3.0	I	G	2-8	¾-3	.....	No
Hawley.....P	1,939	U	2.3	R	No	No	6.0	IG	G Wr	1½-8	.....	0.03	No
Hays.....P	2,231	S	....	.....	SoA	Hy	....	I	GL	2-24	½-4	.....	No
Heidelberg.....P	2,094	S	....	.....	SoA	Hy	....	I	GL	2-24	½-4	.....	No
Hellertown.....M	3,000	U	2.0	R	No	No	7.0	I	G	4-10	.....	.....	No
Hughesville.....P	1,577	U	1.0	R	No	Ch	6.5	.....	LI	2-6	.....	0.3	No
Hyndman.....P	1,179	S	1.3	R	No	No	5.0	I	G	2-10	.....	.....	No
Ingram.....P	2,900	S	....	.....	SoA	Hy	8.0	I	L	4-12	½-4	.....	No
Kennett Square.....M	2,398	S	0.8	RPp	No	Ch	7.0	I	GL	3-6	¾	0.3	No
Knoxville.....M	700	U	0.5	R	No	No	4.0	W	G	4-6	.....	0.2	No
Kutztown.....M	2,800	U	1.0	R	No	Ch	7.2	I	G	4-10	.....	1.0	No
Lansdowne.....P	4,797	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Leechburg.....P	4,000	....	3.5	R	Yes	.....	8.0	I	L	2-12	½-¼	.....	Yes
Ligonier.....M	1,807	S	3.5	R	No	No	10.0	I	L	4-8	½-¼	None	Yes
Lititz.....M	4,000	U	0.3	R	No	No	6.0	I	I	4-12	¾	0.4	No
Lower Moreland.....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
McDonald.....P	2,751	S	2.5	RPp	A	Hy	18.0	I	L	4-10	.....	3.5	Yes
Malvern.....M	1,286	U	0.5	RPp	No	No	4.5	I	G	2-8	½-¼	0.61	No
Mansfield.....P	1,800	U	4.0	R	.....	.....	8.5	I	G	1-6	¾-1	0.6	No
Marietta.....P	1,735	S	2.5	R	No	Ch	9.0	I	G	4-12	¾-1	1.6	No
Marple.....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Marysville.....P	1,877	S	2.5	R	No	No	10.0	I	G	4-8	.....	None	...
Masontown.....M	1,800	S	1.25	T	O	Ch	4.0	I	BG	4-6	½-1	0.7	No
Matamoras.....P	1,535	U	1.0	R	No	No	6.0	I	G	2-10	¾	0.4	No
Mauch Chunk.....P	3,868	U	....	R	No	No	8.0	I	G	2-8	.....	.....	...
Mercer.....P	1,932	S	0.8	R	A	.....	8.0	I	I	4-6	.....	0.6	...
Mercersburg.....P	1,663	S	6.0	R	No	Hy	8.0	I	G	4-12	½-1	.....	...
Meyersdale.....P	3,716	U	3.0	R	.....	.....	14.0	I	G	2-8	¾	0.2	No
Middleburg.....P	1,000	S	3.0	R	No	No	6.5	IW	G	4-6	.....	None	...
Mifflinburg.....M	1,744	S	6.0	R	No	No	6.0	I	G	4-6	1	None	...
Mifflintown.....P	1,083	S	4.5	R	No	No	7.0	I	I	4-8	.....	None	No
Milford.....P	1,240	U	0.8	R	No	No	4.5	I	GL	3-6	½-¾	None	No
Millbourne.....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Millersburg.....P	2,936	U	2.0	R	No	Ch	15.0	I	G	4-8	.....	0.5	Yes
Mill Hall.....P	1,500	S	10.0	None	No	Hy	2.5	I St	G St	4-6	¾	None	No
Monaca.....M	3,838	....	....	R	.....	Ch	....	.....	I	½-4	.....	.....	Yes
Montoursville.....M	1,904	U	1.5	R	.....	.....	6.0	I	.....	3-10	.....	.....	No
Montrose.....P	1,661	S	1.0	R	No	Ch	8.0	I	G	4-6	½-2	0.8	Yes
Morton.....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Mt. Joy.....M	2,192	S	1.0	R	.....	Ch	4.0	I	G	4-12	.....	1.0	...
Mt. Lebanon.....P	2,258	S	....	....	SoA	Hy	....	I	GL	2-24	½-4	.....	No
Mt. Union.....M	4,744	U	4.0	R	No	Ch	16.0	I	G	4-12	¾	.....	No
Muncy.....P	2,200	U	3.5	R	.....	.....	11.0	.....	.....	4-10	.....	0.8	...
Narberth.....P	3,704	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
New Bethlehem.....P	1,662	S	0.0	R	A	.....	14.0	I	I	4-6	.....	1.5	...
New Bloomfield.....P	1,000	U	1.5	R	.....	.....	1.5	.....	I	4-6	.....	.....	...
New Oxford.....M	970	S	0.5	Pp	O	No	3.3	I	G	1-8	¾-4	0.2	...
New Wilmington.....P	858	U	1.3	R	No	No	4.5	I	G	1-8	½-3	0.1	No
Nicholson.....P	852	S	2.0	.....	No	No	4.0	I	G	2-8	½-2	.....	No
North East.....M	3,481	SU	5.0	R	A	Ch	18.0	I	G	4-8	.....	0.4	No
Northumberland.....P	4,000	SU	5.0	RPpT	No	Ch	16.0	IW	G	4-8	½-1	.....	No
North Wales.....P	2,200	U	....	Pp	No	No	8.0	I	LI	2-8	½-¾	0.3	No
Norwood.....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Orwigsburg.....M	1,905	U	3.0	R	.....	.....	4.0	I	LI	4-12	.....	.....	...
Osceola Mills.....P	2,355	S	4.0	RT	.....	.....	7.0	I	G	4-10	.....	0.3	No
Overbrook.....P	2,185	S	....	....	So A	Hy	....	I	GL	2-24	½-4	.....	No
Parkers Landing.....P	1,244	S	0.0	Pp	O	.....	3.0	.....	G	4	2	.....	No
Patton.....P	3,628	S	0.1	RPpT	A	Ch	10.5	I	LI	2-8	½-2	.....	...
Pennsburg.....P	1,404	U	4.0	R	No	Ch	....	I	G	4-12	.....	None	No
Perkasie.....P	3,150	U	2.5	R	A	Ch	8.9	I	G	4-6	.....	0.3	No
Port Allegheny.....P	2,400	SU	2.0	R	No	No	15.0	I	L	3-8	½-8	0.4	No
Prospect Park.....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Radnor.....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Red Lion.....P	3,198	U	1.0	R	No	No	5.0	I	L	4-6	.....	0.4	No
Reynoldsville.....P	4,116	U	0.3	RPp	.....	.....	20.0	I	Wr	6-20	.....	1.0	No
Ridley.....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Ridley Park.....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...

Consumption		Number of Services		Number of Meters		Per Cent Metered		Meter Rates per 1,000 Gallons		Meters Owned by	Hydrants			Average Pressure lbs. per sq. in.	
Average Daily in 1,000 gals.	Per Capita	Domestic	Industrial	Domestic	Industrial	Domestic	Industrial	Max. Dom.	Min. Ind.		Number	Owned by	Aver. Rental each per year	Domestic	Fire
125	45	780	.....	64	4	8	.....	45¢	10¢	.....	30	P	$50	90	103
200	48	621	0	180	0	29	0	35¢	.....	H	26	P	$23.82	75	88
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	26	P	$60	60	60
.....	.....	.....	.....	.....	.....	100	100	34¢	14¢	P	18	P	$50	145	145
75	15	1,500	12	1,500	12	100	100	45¢	25¢	H	145	M	None	65	65
300	108	850	26	850	26	100	100	40¢	7¢	H	31	P	$20	140	140
122	81	500	5	3	3	.....	60	40¢	40¢	P	30	P	$25	50	50
10	10	136	.....	136	5	100	.....	.....	.....	M	22	M	None	60	70
Unknown	.....	325	80	.....	.....	.....	.....	.....	.....	.....	25	P	$25	53	65
.....	.....	.....	.....	.....	.....	100	100	34¢	14¢	P	20	P	$50	145	145
.....	.....	.....	.....	.....	.....	100	100	34¢	14¢	P	18	P	$50	145	145
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	43	M	$30	106	106
140	89	475	20	0	20	0	100	.....	12¢	P	37	P	$25	80	80
Unknown	.....	275	3	0	0	0	0	.....	.....	.....	29	P	$10	100	100
.....	.....	250	.....	250	.....	100	100	34¢	14¢	P	36	P	$50	50	150
250	104	.....	.....	.....	2	.....	.....	.....	12¢	M	63	M	None	32	.....
Unknown	.....	200	.....	200	.....	100	.....	30¢	16¢	H	32	M	None	100	100
291	104	550	.....	300	.....	55	.....	40¢	10¢	M	52	M	$25	90	100
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	42	P	$60	60	60
250	63	950	9	950	9	100	100	67¢	16¢	P	46	M	.....	150	150
60	33	562	4	0	0	0	0	.....	.....	.....	25	M	None	65	85
150	38	845	.....	696	.....	83	.....	35¢	15¢	M	80	M	None	65	65
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	3	P	$60	60	60
300	109	655	.....	655	.....	100	100	35¢	35¢	P	45	P	.....	100	100
75	58	325	6	325	6	100	100	40¢	20¢	H	23	M	None	40	40
175	97	450	.....	.....	3	.....	.....	.....	30¢	P	47	P	$25	90	90
250	144	600	10	0	3	0	30	.....	7¢	P	43	P	$17.50	87	87
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	1	P	$60	60	60
Unknown	.....	529	1	295	1	56	100	20¢	10¢	H	28	P	$20	60	60
100	56	.....	.....	800	.....	.....	.....	30¢	.....	H	19	M	None	75	75
100	65	450	5	0	5	0	100	.....	.....	P	50	P	.....	.....	.....
.....	.....	537	.....	.....	.....	.....	.....	.....	.....	.....	32	.....	.....	65	65
200	104	500	.....	500	.....	100	.....	.....	.....	.....	40	.....	.....	108	108
200	120	.....	.....	6	.....	.....	.....	15¢	10¢	P	25	P	$20	80	80
300	81	850	.....	850	20	100	.....	50¢	30¢	P	36	P	$40	88	88
120	120	300	5	0	20	0	100	.....	5¢	P	34	P	$15	100	100
275	158	560	15	0	15	0	100	.....	5¢	M	60	M	.....	60	60
200	185	400	.....	1	3	.....	.....	35¢	10¢	P	22	P	.....	75	75
Unknown	.....	367	.....	0	.....	0	.....	.....	.....	.....	46	M	$6	70	.....
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	11	P	$60	60	60
200	68	820	.....	425	22	52	.....	50¢	8¢	P	39	P	$18	65	.....
250	167	250	.....	30	4	12	.....	30¢	3¢	H	8	P	$15	110	.....
600	156	930	10	940	10	100	100	38¢	16¢	H	68	M	.....	142	145
Unknown	.....	457	7	2	.....	.....	.....	.....	.....	M	60	M	.....	55	55
300	180	415	22	51	22	12	100	50¢	6¢	P	30	M	$30	100	115
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	8	P	$60	60	60
120	55	400	3	.....	1	.....	33	.....	.....	.....	48	M	.....	45	45
.....	.....	.....	.....	.....	.....	100	100	34¢	14¢	P	52	P	$50	145	145
500	105	1,300	10	90	10	7	100	50¢	7¢	M	60	M	.....	90	90
400	182	500	30	0	30	.....	100	.....	.....	.....	41	.....	.....	65	65
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	30	P	$60	60	60
100	60	250	.....	175	.....	70	.....	.....	.....	.....	27	.....	.....	60	60
Unknown	.....	150	.....	.....	.....	.....	.....	.....	.....	.....	14	P	$25.71	40	40
30	31	160	8	10	8	6	100	30¢	18¢	M	34	M	.....	42	45
60	70	230	.....	150	5	65	.....	50¢	40¢	P	25	P	.....	47	47
Unknown	.....	209	7	0	0	0	0	.....	.....	P	15	P	.....	58	58
600	172	1,000	.....	1,000	.....	100	.....	25¢	6¢	H	75	M	None	68	.....
500	125	800	.....	50	.....	6	.....	40¢	5¢	P	42	P	.....	100	100
.....	.....	670	50	0	50	0	100	.....	.....	P	39	P	.....	47	47
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	22	P	$60	60	60
.....	.....	580	.....	.....	.....	0	.....	.....	.....	.....	.....	.....	.....	75	75
550	234	560	6	5	7	1	100	14¢	4¢	P	29	.....	.....	125	125
.....	.....	.....	.....	.....	.....	100	100	34¢	14¢	P	21	P	$30	145	145
Unknown	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	35	M	.....	.....	.....
.....	.....	.....	.....	.....	.....	100	100	32¢	11¢	PH	35	P	.....	90	90
1	.....	406	20	0	0	0	0	32¢	11¢	.....	42	P	$12	109	97
250	79	759	19	240	17	32	89	94¢	6¢	P	71	P	$48	50	65
350	146	460	25	0	20	0	80	.....	20¢	P	56	P	$20	65	65
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	24	P	$60	60	60
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	76	P	$60	60	60
150	47	200	.....	18	.....	10	.....	.....	45¢	P	100	P	None	50	70
400	97	849	.....	849	.....	100	.....	18¢	7¢	H	56	M	.....	118	118
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	30	P	$60	60	60
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	34	P	$60	60	60

Municipality Ownership of Water works	Population	Source Type	Source Aver. Miles from City	Storage	Filters	Sterilized	Distribution System Total Miles of Main	Distribution System Kind of Pipe Mains	Distribution System Kind of Pipe Services	Pipe Sizes Inches Mains	Pipe Sizes Inches Services	Pump Capacity m. g. d.	Main Supply Metered
PENNSYLVANIA (Con.)													
Roaring Spring....M	2,379	S	2.5	.....	A	.....	....	.....	.....	.....	.....	.....	No
Robinson....P	3,453	S	....	.....	So A	Hy	....	I	GL	2-24	¾-4	.....	No
Rockledge....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Rockwood....P	1,362	SU	3.0	R	No	No	7.0	WTe	Wr	4-16	.....	0.9	No
Rutledge....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Saltsburg....M	1,022	U	0.5	R	.....	.....	4.0	I	LG	4-8	.....	0.8	No
Schuylkill....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Scott....P	4,927	S	....	.....	So A	Hy	....	I	GL	2-24	¾-4	.....	No
Selinsgrove....P	2,200	S	0.1	R	No	Ch	6.0	I	G	3-12	.....	6.9	No
Sewickley....M	4,955	S	1.0	RPp	.....	Ch	24.0	I	L	4-16	1-2	3.0	No
Sharon Hill....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Sharpsville....M	4,674	U	0.3	PpT	No	Ch	7.3	I	I	4-10	¾	0.3	Yes
Shillington....P	3,000	S	3.0	R	No	Hy	9.0	I	G Wr	¾-6	¾	0.4	No
Shippensburg....M	4,372	S	5.0	R	No	Ch	17.0	I	G	4-12	.....	.....	...
Slatington....M	4,014	U	2.5	None	No	No	11.0	I	L	4-8	¾	None	No
Slippery Rock....M	1,200	S	0.5	R	No	No	4.0	I	I	2-6	¼-1	0.2	...
Snowden....P	2,889	S	....	.....	So A	Hy	....	I	GL	2-24	¾-4	.....	No
Somerset....M	3,121	U	1.0	R	No	No	8.6	I	L	4-10	½-2	1.0	No
Springdale....M	3,500	U	0.5	R	.....	.....	10.0	I	L	4-10	.....	1.7	No
Springfield....P	.....	S	....	RPp	A	Ch	....	IWrCl	GL	4-20	½-8	.....	...
Spring Grove....P	1,115	S	0.5	R	.....	.....	4.0	I	Wr	4-12	.....	1.0	No
State College....P	3,000	S	4.5	R	No	Ch	18.0	IW St	G	2-12	¾-2	0.4	No
Stoneboro....M	1,405	U	2.8	R	No	No	4.0	I	G	2-6	¾-1	None	No
Strasburg....M	1,100	U	5.0	R	.....	.....	7.0	I	G	4-8	.....	.....	No
Summerville....P	1,199	U	0.5	R	.....	.....	2.5	I	I	2-4	¾	.....	No
Swarthmore....P	.....	S	....	RPp	A	Ch	....	IWrCl	GL	4-20	½-8	.....	...
Thompsontown....P	293	U	1.5	R	No	No	2.0	W	Wr	4	¼-¾	0.03	No
Tidioute....P	1,063	S	4.5	R	.....	.....	5.0	I	G	4-10	.....	None	No
Tinicum....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Tower City....P	2,324	S	2.5	R	No	No	9.0	I	G	4-8	¾	1.2	No
Trafford....P	4,000	S	....	.....	O	Ch	....	I	G	4-42	½-12	.....	...
Tredyffrin....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Trevorton....P	2,800	U	0.0	R	No	No	4.0	IW	G	4-6	.....	0.2	No
Troy....M	1,419	U	3.0	R	.....	.....	6.0	.....	.....	4-6	.....	0.2	No
Union....P	1,589	S	....	.....	So A	Hy	....	I	GL	2-24	¾-4	.....	No
Upper Darby....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Upper Dublin....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Upper Merion....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Upper Moreland....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Walnutport....P	1,050	U	2.0	R	No	Ch	....	I	I	5-6	.....	None	Yes
Wampum....M	1,000	U	0.0	R	No	No	2.5	I	.....	.....	½	0.3	No
Wellsboro....P	4,000	SU	11.0	R	A	Hy	11.0	I	G	4-12	¾-1	0.3	No
Westfield....M	1,303	U	2.0	R	.....	.....	6.0	I	G	3-8	.....	.....	No
W. Homestead....P	3,435	S	....	.....	So A	Hy	....	I	GL	2-24	¾-4	.....	No
West Newton....P	2,645	U	1.0	RPp	No	Hy	6.7	I	GL	4-10	¾-¾	0.3	No
Whitaker....P	1,881	S	....	.....	So A	Hy	....	I	GL	2-24	¾-4	.....	No
Whitemarsh....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
White Haven....P	1,438	U	1.5	R	No	No	5.0	I	GL	2-8	.....	.....	No
Wilcox....P	800	U	0.3	R	No	No	1.0	I	G	1-4	.....	.....	No
Williamstown....P	4,300	S	3.0	R	.....	.....	10.0	IW	G	4-8	¾-¾	.....	...
Willistown....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
Wyomissing, etc....P	2,062	U	....	RPp	No	.....	....	.....	GL	6-8	¾	1.2	Yes
Yardley....P	1,262	U	0.0	Pp	No	.....	4.0	.....	.....	4-12	.....	.....	No
Yeadon....P	.....	S	....	RPp	A	Ch	....	I Wr Cl	GL	4-20	½-8	.....	...
RHODE ISLAND													
Centerville....P	3,035	S	7.0	Pp	.....	.....	27.5	I	G	4-18	.....	None	No
Jamestown....P	2,000	S	....	Pp	A	.....	11.7	I Cl	G Cl	6-10	1-4	1.6	No
SOUTH CAROLINA													
Aiken....M	4,103	S	6.3	Pp	No	No	19.0	IW	G	4-14	.....	0.7	No
Belton....M	2,000	U	....	RPp	No	No	3.2	I	G	6-10	.....	0.1	No
Bennettsville....M	3,197	U	0.5	RT	.....	.....	10.0	I	LG	4-10	¾-2	2.2	No
Blacksburg....M	1,800	U	1.0	R	No	No	4.0	I	I	3-8	¾	0.04	No
Cheraw....M	3,150	S	1.0	RT	A	Hy	12.0	I St	G	¾-10	.....	2.6	No
Conway....M	2,500	U	....	RPpT	No	No	5.0	IG	G	1-6	.....	.....	No
Darlington....P	4,669	U	0.0	RPp	.....	.....	8.0	I	G	4-10	.....	1.3	Yes
Easley....M	4,000	SU	3.0	RT	O	Ch	5.0	I	G	8	¾-4	3.6	No
Edgefield....M	1,800	U	0.5	RT	No	No	6.0	.....	G	6-8	.....	1.1	No
Fountain Inn....M	.....	U	0.5	RT	No	No	8.0	I	G	4-8	.....	1.4	No
Honea Path....M	3,000	U	....	RT	.....	.....	7.0	I	G	1-¾	.....	0.1	...
Laurens....M	4,929	S	1.0	RPp	A	Ch	15.0	I	G	4-12	¾-2	4.0	Yes
Liberty....M	2,000	S	1.5	RPp	O	No	5.0	I	I	4-8	.....	0.2	No
Manning....M	2,022	U	0.0	RPpT	No	No	4.8	I	G	6-10	¾	1.2	Yes
No. Augusta....M	1,800	U	1.5	RPp	No	Ch	6.0	I	G	4-6	¾-1	0.8	No
St. George....P	1,386	U	0.0	RT	No	No	3.0	I St	G	2-8	½-¾	0.1	No

Consumption		Number of Services		Number of Meters		Per Cent Metered		Meter Rates per 1,000 Gallons		Meters Owned by	Hydrants			Average Pressure lbs. per sq. in.	
Average Daily in 1,000 gals.	Per Capita	Domestic	Industrial	Domestic	Industrial	Domestic	Industrial	Max. Dom.	Min. Ind.		Number	Owned by	Aver. Rental each per year	Domestic	Fire
Unknown	.....	466	4	0	8	0	100	.....	.....	M	55	M	.....	80	160
.....	.....	.....	.....	.....	.....	100	100	34¢	14¢	P	0	.....	.....	145	145
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	15	P	$60	60	160
200	147	300	3	0	8	0	100	.....	.....	P	30	P	$20	100	100
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	10	P	$60	60	60
75	73	250	.....	200	.....	80	.....	25¢	25¢	M	24	M	$6	100	100
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	0	.....	$60	60	60
.....	.....	.....	.....	.....	.....	100	100	34¢	14¢	P	32	P	$50	145	145
300	136	505	95	0	0	0	0	.....	.....	.....	55	P	$18.50	85	85
1,500	302	1,200	.....	108	.....	9	.....	38¢	10¢	M	140	M	.....	47	66
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	21	P	$60	60	60
250	54	900	3	1,000	3	100	100	30¢	30¢	M	106	M	$20	75	112
200	67	700	50	20	30	30	60	8¢	8¢	P	50	P	$15	80	80
500	114	1,000	.....	0	20	.....	.....	12¢	.....	H	85	.....	.....	.....	.....
300	75	750	5	0	5	0	100	.....	8¢	M	45	M	None	80	140
15	13	258	.....	260	.....	100	.....	50¢	.....	P	32	M	.....	40	60
.....	.....	.....	.....	.....	.....	100	100	34¢	14¢	P	0	.....	.....	145	145
200	64	900	.....	900	.....	100	.....	23¢	20¢	P	94	M	None	90	90
200	57	800	.....	800	.....	100	.....	50¢	50¢	H	64	M	.....	160	160
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	9	P	$60	60	60
450	405	184	10	.....	3	.....	.....	30¢	9¢	P	16	M	$5	80	150
275	92	800	5	231	5	29	100	25¢	6¢	P	53	M	$10	68	68
Unknown	.....	225	.....	.....	1	0	.....	.....	6¢	.....	14	M	.....	48	48
Unknown	.....	190	.....	.....	6	.....	.....	.....	.....	H	38	.....	.....	65	65
30	25	144	.....	18	.....	10	.....	$1.00	50¢	P	6	P	$20	65	65
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	35	P	$60	60	60
20	68	70	0	0	0	0	0	.....	.....	.....	12	P	$8.12	80	80
150	142	240	.....	0	4	.....	.....	.....	.....	.....	38	P	$12	50	65
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	28	P	$60	60	60
.....	.....	500	20	250	5	50	25	40¢	20¢	P	28	P	.....	70	70
.....	.....	.....	.....	.....	.....	100	100	25¢	11¢	PH	30	P	$50	85	.....
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	26	P	$60	60	60
75	27	156	.....	6	.....	5	.....	50¢	.....	P	30	P	$50	60	.....
100	71	300	.....	.....	.....	.....	.....	.....	.....	.....	40	M	.....	70	70
.....	.....	.....	.....	.....	.....	100	100	34¢	14¢	P	0	.....	.....	145	145
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	134	P	$60	60	60
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	0	.....	$60	60	60
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	1	P	$60	60	60
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	4	P	$60	60	60
5	5	100	3	.....	1	.....	.....	.....	.....	P	5	P	.....	120	120
10	10	103	1	103	1	100	100	42¢	15¢	H	16	M	.....	97	97
400	100	900	30	0	30	0	100	.....	13¢	P	87	P	$13.79	55	55
20	15	300	.....	130	.....	42	.....	50¢	.....	H	32	M	.....	80	80
.....	.....	.....	.....	.....	.....	100	100	34¢	14¢	P	2	P	$50	145	145
200	76	665	4	665	4	100	100	60¢	22¢	P	52	P	$80	125	125
.....	.....	.....	.....	.....	.....	100	100	34¢	14¢	P	22	P	$50	145	145
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	8	P	$60	60	60
.....	.....	350	50	0	12	.....	24	.....	.....	P	0	.....	.....	43	.....
40	50	85	15	85	15	100	100	50¢	30¢	H	0	.....	.....	40	.....
350	81	800	3	.....	2	.....	67	6¢	6¢	P	37	P	$20	83	83
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	3	P	$60	60	60
.....	.....	1,300	6	104	.....	8	.....	$3	75¢	P	50	M	$5.50	65	65
100	79	180	2	1	.....	.....	.....	$1	30¢	M	33	P	$12.50	60	90
.....	.....	.....	.....	.....	.....	100	100	40¢	15¢	P	18	P	$60	60	60
Unknown	.....	1,000	.....	1,200	.....	100	.....	30¢	.....	H	208	P	.....	74	74
Unknown	.....	625	.....	0	25	.....	.....	.....	.....	H	84	P	$40	65	65
300	73	900	.....	700	.....	78	.....	.....	.....	M	90	M	None	65	65
50	25	182	21	150	21	82	100	30¢	20¢	M	37	M	None	65	.....
200	63	550	.....	550	.....	100	.....	30¢	20¢	H	100	M	None	75	125
Unknown	.....	.....	.....	120	.....	.....	.....	33¢	.....	.....	40	M	.....	.....	48
220	70	400	10	400	10	100	100	37¢	15¢	M	50	MH	.....	60	60
Unknown	.....	.....	.....	200	50	90	.....	43¢	43¢	H	25	M	.....	40	40
200	43	475	155	475	155	100	100	30¢	30¢	P	103	P	$40	60	60
300	75	300	20	250	20	83	100	20¢	7.5¢	MH	105	M	None	65	125
60	33	140	.....	140	.....	100	.....	40¢	.....	H	74	M	$25	85	125
Unknown	.....	225	4	225	4	100	100	30¢	30¢	M	.....	M	.....	64	75
50	17	206	.....	185	.....	90	.....	55¢	.....	M	36	M	.....	.....	85
250	51	600	25	600	25	100	100	25¢	14¢	MH	80	M	$40	58	58
25	13	.....	8	130	.....	.....	.....	20¢	.....	M	19	M	.....	.....	.....
70	.....	250	1	265	1	100	100	50¢	30¢	M	58	M	None	64	80
25	14	350	19	350	19	100	100	50¢	50¢	H	52	M	None	100	125
25	18	90	8	0	0	0	0	.....	.....	P	6	P	None	50	50

Sanitation of Resorts and Tourist Camps

By R. M. Olin, M. D.
Michigan Commissioner of Health

SANITARY regulations have become a recognized essential for the successful summer resort, and their importance is becoming equally appreciated for the more recent vacation development, the tourist camp.

The resort problem is frequently simplified by the maintenance of a governing body with sufficient authority to enforce regulations protecting public and private property and the public health. Such a body should be in operation at every resort, with a responsible official in charge of the enforcement of regulations.

Centralized control of state and municipal tourist camps has been quite satisfactory, but sanitary supervision of private camps is a matter of personal habit and opinion, and consequently no regularity may be expected. However, with the introduction of the pay camp and its full-time supervision, better conditions can be hoped for. Sanitary regulations necessary to the successful resort apply equally to the permanent tourist camp.

Precautions as to Water-Supply

All water-supplies, large or small, public or private, should be tested by laboratory analysis. Analyses in Michigan are made free of charge by the Michigan Department of Health. Containers for collection and mailing of samples will be sent upon request.

Supplies found upon such examination to be unsafe should be conspicuously placarded to prevent their use for drinking purposes by unsuspecting persons. Surface water should never be used for drinking unless boiled.

Approved Types of Toilets

Cesspools are often a source of contamination of water-supplies by seepage. Such pools hide filth without destroying its dangers.

No cesspool or earth vault privy should be maintained within 300 feet of any well used for drinking purposes, unless it is known that a layer of impervious soil, such as clay, protects the well from pollution.

No privy should be maintained near any residence, hotel, or place where foodstuffs are prepared or served, unless it is screened so as to effectively exclude flies and rodents.

The chemical closet, the dry earth removable box type closet, and the sanitary privy are recommended for use at small resorts. Bulletins describing these may be procured from the Michigan Department of Health.

Garbage Disposal

The community should provide for collection and removal of garbage at least twice weekly. In the meantime garbage cans should be kept tightly covered. If possible, garbage should be removed entirely outside the resort, but it must not be thrown into streams or lakes.

Where the community does not make provision for the removal of garbage from the premises, the individuals should assume the responsibility and bury all waste foods. If garbage is buried, it should be covered at once before flies can lay eggs upon it.

Cleaning fish upon the beach should be prohibited. Fish offal should be disposed of as garbage.

The discharging of wastes from toilets and sinks into streams or lakes should be strictly prohibited.

Rubbish should be burned or buried. Empty tin cans, bottles, etc., should not be allowed to collect water from rains, thus providing breeding-places for mosquitoes. They should be buried, if possible, or removed to a safe distance.

Fly and Mosquito Control

Many people believe that flies and mosquitoes are inevitable at a summer resort. With proper precautions both these pests can be prevented. A thoroughly clean resort has no flies or mosquitoes. Screen the kitchens, dining-rooms, and sleeping-rooms. Destroy the breeding-places of flies, such as manure piles, decaying garbage, and insanitary privies.

Stagnant pools are the delight of the mosquito. Screen all rain barrels, pour oil on standing waters which cannot be drained away, and bury or remove all tin cans, bottles, and other receptacles which collect water from rains and serve as breeding-places of mosquitoes. See that roof gutters and downspouts cannot retain any water.

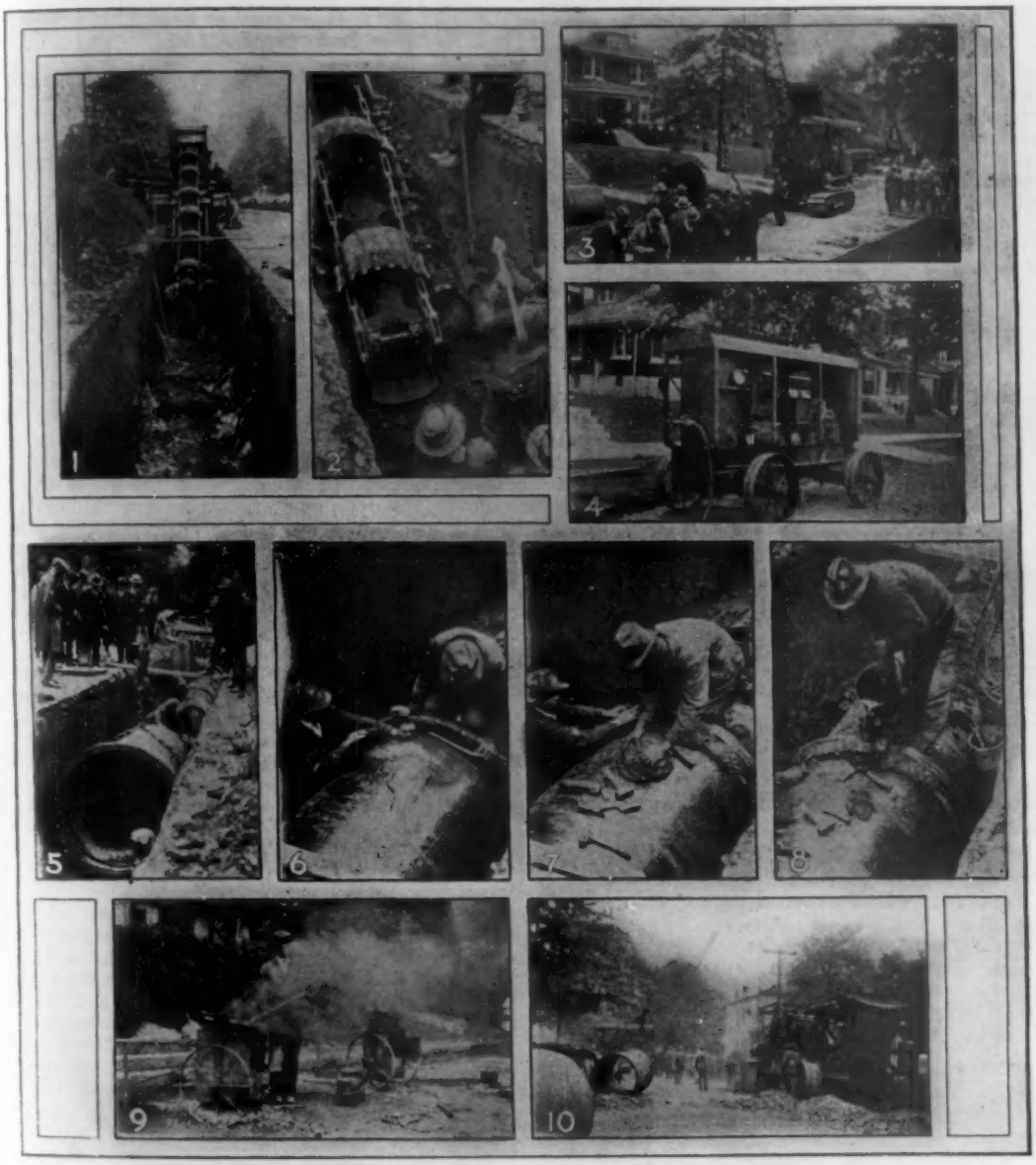
Safeguarding Food Supplies

Food supplies should be carefully protected. They should be bought from a clean, reliable dealer, and stored in a clean, cool place well protected from flies and rodents.

Equally important with the water is the milk supply. An effective milk ordinance should be passed and rigidly enforced.

Louisville Lays 48-Inch Water-Main

Job Proves a Feature of American Water Works Association Convention



SERIES OF PHOTOGRAPHS SHOWING PROGRESSIVELY THE LAYING OF A LENGTH OF 48-INCH CAST IRON PIPE BY A WELL-TRAINED GANG

The Louisville Water Company, Louisville, Ky. (John Chambers, Chief Engineer and Superintendent), is laying 5½ miles of 48-inch main with its own equipment, depicted above. The company has trenched and laid as many as 15 lengths of 48-inch pipe and a tee in one day and as many as 91 lengths of 20-inch diameter pipe in one day. 1. Buckeye traction ditcher excavating trench to depth of 9 feet without sheathing. 2. Business end of excavator, showing rotary cutters and method of still further widening the trench. 3. Austin No. 5 combination dragline-crane lifting section of 48-inch pipe from storage to trench. 4. Chicago Pneumatic compressor used to run pavement breakers immediately ahead of ditcher. 5. Setting main in trench. 6. Driving in the braided hemp packing, the first step in making the joint. 7. Placing clay dams on asbestos "snake" before pouring joint. 8. Pouring Leadite joint, using about 25 pounds per joint. 9. Leadite heating kettles. 10. General view of job, showing U. S. cast iron pipe at left, Austin crane in background, and Buckeye excavator at right

How a Bureau of Fire Prevention Should Be Organized

An Ordinance Establishing a Bureau of Fire Prevention, Providing Officers Therefor, and Defining Their Powers and Duties

BE it ordained by the City Council (or Board of Commissioners) of the city (town) of....
.....

SECTION 1. A Bureau of Fire Prevention in the Fire Department of the city (town) of..... is hereby established which shall be operated under the supervision of the Chief of the Fire Department.

The Chief of the Fire Department shall designate an officer (or member) of the Fire Department as Chief Inspector of the Bureau of Fire Prevention, who shall hold this office at the pleasure of the Chief of the Fire Department.

The Chief of the Fire Department may also designate such number of assistant inspectors as shall from time to time be authorized by the City Council (or Board of Commissioners).

NOTE:—If desired, the head of the Bureau may be designated as "Fire Marshal" or "Fire Warden," etc., for the purpose of this ordinance; the Chief Inspector may be designated as "Deputy Fire Marshal" or "Deputy Fire Warden" and the Assistant Inspectors as "Assistant Fire Marshals" or "Assistant Fire Wardens," etc.

SECTION 2. It shall be the duty of the officers of the Bureau of Fire Prevention to enforce all laws and ordinances of the state (county), and city, covering the following:

1. The prevention of fires;
2. The storage and use of explosives and flammables;
3. The installation and maintenance of automatic and other fire-alarm systems, and fire-extinguishing equipment;
4. The maintenance and regulation of fire-escapes;
5. The means and adequacy of exit in case of fire, from factories, schools, hotels, lodging-houses, asylums, hospitals, churches, halls, theaters, amphitheaters, and all other places in which numbers of persons work, live, or congregate, from time to time, for any purpose;
6. The investigation of the cause, origin, and circumstances of fires.

They shall have other powers and perform such other duties as are set forth in other sections of this ordinance, and as may be conferred and imposed from time to time by law. The Chief of the Fire Department (Fire Marshal) may delegate any of his powers or duties under this ordinance to the Chief Inspector.

SECTION 3. It shall be the duty of the Chief of the Fire Department to investigate and to recommend to the City Council (Board of Commissioners) such additional ordinances, or amendments to existing ordinances, as he may deem necessary for safeguarding life and property against fire.

SECTION 4. The Chief of the Fire Department (Fire Marshal) shall prepare instructions for the Chief Inspector and his assistants, and forms for their use in the reports required by this ordinance.

SECTION 5. The Bureau of Fire Prevention shall investigate the cause, origin and circumstances of every fire occurring in the city (town) by which property has been destroyed or damaged and, so far as possible, shall determine whether the fire is the result of carelessness or design. Such investigations shall be begun immediately upon the occurrence of such a fire, by the assistant in whose district the fire occurs, and if it appears to the officer making such an investigation that such fire is of suspicious origin, the Chief of the Fire Department shall be immediately notified of the fact; he shall take charge immediately of the physical evidence, shall notify the proper authorities designated by law to pursue the investigation of such matters, and shall further cooperate with the authorities in the collection of evidence and in the prosecution of the case. Every fire shall be reported in writing to the Bureau of Fire Prevention within two days after the occurrence of the same, by the officer in whose jurisdiction such a fire has occurred. Such report shall be in such form as shall be prescribed by the Chief of the Fire Department, and shall contain a statement of all facts relating to the cause, origin and circumstances of such fire, the extent of the damage thereof, and the insurance upon such property, and such other information as may be required.

An Outline of Powers and Duties

The accompanying report of the Committee on Laws and Ordinances, presented and adopted at the annual meeting of the National Fire Protection Association, May, 1925, is here published in full, as an outline of the powers and duties of a properly organized Bureau of Fire Prevention, and as suggesting the exact wording for an ordinance to establish such a Bureau.

SECTION 6. Before licenses may be issued for the keeping, storage, use, manufacture, sale, handling, transportation or other disposition, of highly flammable materials and rubbish, crude petroleum or any of its products, gun or blasting powder, dynamite, or explosives of any kind, including fireworks, firecrackers, and signaling explosives, the Chief of the Fire Department, the Chief Inspector, or his assistants shall inspect and approve the receptacles, vehicles, buildings or storage places to be used for any such purposes.

SECTION 7. The Chief of the Fire Department, Chief Inspector, or an assistant specially designated thereto, shall inspect, as often as may be

necessary, but not less than four times a year, all specially hazardous manufacturing processes, storages or installations of acetylene or other gases, chemicals, oils, explosives and flammable materials, all interior fire-alarms and automatic sprinkler systems, and such other hazards or appliances as the Chief of the Fire Department shall designate, and shall make such orders as may be necessary for the enforcement of the laws and ordinances governing the same and for safeguarding of life and property from fire.

SECTION 8. It shall be the duty of the Chief of the Fire Department to inspect, or cause to be inspected by the Bureau of Fire Prevention, or by the Fire Department officers and members, as often as may be necessary, but not less than twice a year in outlying districts and four times a year in the closely built portions of the city (town) all buildings, premises and public thoroughfares except the interiors of private dwellings, for the purpose of ascertaining and causing to be corrected any conditions liable to cause fire, or any violations of the provisions or intent of any ordinance of the city affecting the fire hazard.

Whenever any inspector, as defined above, shall find in any building, or upon any premises or other place, combustible or explosive matter or dangerous accumulations of rubbish or unnecessary accumulation of waste paper, boxes, or any highly flammable materials especially liable to fire, and which is so situated as to endanger property; or shall find obstructions to or on fire-escapes, stairs, passageways, doors or windows, liable to interfere with the operations of the Fire Department or egress of occupants in case of fire, he shall order the same to be removed or remedied, and such order shall forthwith be complied with by the owner or occupant of such premises or buildings, subject to appeal within twenty-four hours to the Chief of the Fire Department, as provided in Section 9 of this ordinance.

Any owner or occupant failing to comply with such order within a reasonable period after the service of the said order, shall be liable to a penalty as hereinafter provided.

The service of any such order may be made upon the occupant of the premises to whom it is directed, either by delivering a copy of same to such occupant personally or by delivering the same to and leaving it with any person in charge of the premises, or in case no such person is found upon the premises, by affixing a copy thereof in a conspicuous place on the door to the entrance of the said premises. Whenever it may be necessary to serve such an order upon the owner of premises, such order may be served either by delivering to and leaving with the said person a copy of the said order, or, if such owner is absent from the jurisdiction of the officer making the order, by mailing such copy to the owner's last known post office address.

SECTION 9. The Chief of the Fire Department or inspectors of the Bureau of Fire Prevention, upon the complaint of any person or whenever he or they shall deem it necessary, shall inspect all buildings and premises within their jurisdiction. Whenever any of said officers shall find any building or other structure which, for want of repairs, lack of or insufficient fire-escapes, automatic or other fire-alarm apparatus or fire-extinguishing equipment or by reason of age or dilapidated condition, or from any other cause, is especially liable to fire, and which is so situated as to endanger other property or the occupants thereof, and whenever such officer shall find in any building combustible or explosive matter or flammable conditions dangerous to the safety of such building or the occupants thereof, he or they shall order such dangerous conditions or materials to be removed or remedied and such order shall forthwith be complied with by the owner or occupant of such premises or building. If such order is made by the Chief Inspector or any of his assistant inspectors, such owner or occupant may within twenty-four hours appeal to the Chief of the Fire Department, who shall, within five days, review such order and file his decision thereon, and unless by his authority the order is revoked or modified it shall remain in full force and be complied with within the time fixed in said order or decision of the Chief of the Fire Department.

Provided, however, that any such owner or occupant may, within five days after the making or affirming of any such order by the Chief of the Fire Department, file his petition with the Municipal Court, praying a review of such order, and it shall be the duty of such court to hear the same within not less than five days nor more than ten days from the time the petition is filed, and to make such order in the premises as right and justice may require, and such decision shall be final. Such parties so appealing to the Municipal Court shall file with said Court within two days a bond in an amount to be fixed by the Court, to be approved by the Court, conditioned to pay all the costs of such appeal in case such appellant fails to sustain his appeal or the same be dismissed for any cause.

SECTION 10. The Chief of the Fire Department, the Chief Inspector, or any assistant inspector, may, at all reasonable hours, enter any building or premises within his jurisdiction for the purpose of making any inspection or investigation which under the provisions of this ordinance, he or they may deem necessary to be made.

SECTION 11. The City (prosecuting) Attorney, upon request of the Bureau of Fire Prevention, shall assist the inspectors in the investigation of any fire which, in their opinion, is of suspicious origin.

SECTION 12. It shall be the duty of the Chief of the Fire Department to require teachers of public, private and parochial schools and educational institutions to have one fire-drill each month and to keep all doors and exits unlocked during school hours.

SECTION 13. The Chief of the Fire Department shall keep, in the office of the Bureau of Fire Prevention, a record of all fires and of all the facts concerning the same, including statistics as to the extent of such fires and the damage caused thereby, and whether such losses were covered by insurance, and if so, in what amount. Such record shall be made daily from the reports made by the inspectors under the provision of this ordinance. All such records shall be public.

SECTION 14. The annual report of the Bureau of Fire Prevention shall be made on or before the .....day of.....and transmitted to the Mayor (or Board of Commissioners); it shall contain all proceedings under this ordinance, with such statistics as the Chief of the Fire Department

may wish to include therein; the Chief of the Fire Department shall also recommend any amendments to the ordinance which, in his judgment, shall be desirable.

SECTION 15. Any person or persons, firm or corporation, violating any of the provisions of this ordinance, or neglecting to comply with any order issued pursuant to any section hereof, shall be guilty of a misdemeanor and upon conviction shall forfeit and pay a fine of not more than twenty-five dollars for each offense, and in addition thereto a fine of not more than twenty-five dollars for each day that said violation is permitted to exist beyond a reasonable period after service as provided in said section, and in default of payment shall be imprisoned not to exceed thirty days for each offense.

SECTION 16. All ordinances or parts of ordinances in conflict with any of the provisions of this ordinance, are hereby repealed.

SECTION 17. This ordinance shall take effect and be in force from and after its passage.

NOTE:—Sections 5, 7, 8, 9, 10 and 11 may be omitted where the subject is properly covered by state law.

Home Rule Charters in Ohio

By Isaac M. Wise

PREVIOUS to November, 1912, all the cities of Ohio were governed under a uniform municipal code enacted in 1902 and radically amended in 1908. The famous Constitutional Convention of 1912, presided over by Herbert S. Bigelow, gave Ohio the best municipal home rule clause of any state. Under Article XVIII, the Legislature is required to pass general laws for the government of cities and villages; additional laws may be also passed for the government of municipalities adopting the same by a referendum vote; and, last but not least, the governing body of any city or village by a two-thirds vote of its members may, or by a petition signed by 10 per cent of the voters, must, submit the question of choosing a commission to frame a charter. If the proposition carries, then the commission must submit a charter within one year to a referendum vote.

The code of 1902 as amended is the charter for all cities and villages which do not adopt a home rule charter, unless they take advantage of an act of the Ohio General Assembly in 1913 (Sections 3515-1-71, of the General Code) which allows any city or village to adopt one of three optional forms of ready-made charters—the federal plan, the commission plan, or the council-manager plan.

All municipalities, however governed, may exercise all powers of local self-government and adopt and enforce within their limits such police, sanitary and other regulations as are not in conflict with general laws. All municipalities may own, operate, lease, and construct public utilities and are free from state control in purely municipal affairs save in taxation and in matter of debt limit.

Home rule charters have been adopted by the method provided for in Article XVIII by the following cities:

Federal Plan—Akron, Ashland, Canton, Columbus, Lakewood, Logan, Shelby, Toledo, Wooster, Youngstown, and Zanesville.

Commission Plan—Middletown.

City Manager Plan—Ashtabula, Cleveland, Cincinnati, Cleveland Heights, Dayton, Gallipolis, Lima, Sandusky, Springfield, and Xenia.

Optional forms of charter, as provided in Sections 3515-1 to 3515-71 of the General Code of Ohio, have been adopted by the following municipalities:

Manager Plan, City—Painesville.

Commission Plan— Upper Arlington.

Manager Plan, Villages—Westerville, South Charleston, and Oberlin.

Where There Is Local Benefit, There Should Be Local Assessment

IN my opinion, a pay-as-you-go policy based on benefit assessments is the most equitable and effective way of enlarging the financial resources of the community in the future. Every public improvement not only benefits the community at large, but it also produces a corresponding local benefit that accrues to the land in the vicinity of the improvement. And where there is a local benefit there should also be a local assessment. We have become so accustomed to the local beneficiaries of public improvements being permitted to retain all of the benefits for themselves, that we accept such a principle as a matter of course without realizing how unfair it is to the entire community. Benefit assessment can and should be made to furnish its proper share of the money so urgently needed for future community requirements. This is the only equitable and effective way that the financial resources of our communities can be enlarged sufficiently to meet future demands. It means spreading the cost of all community activities among all those who benefit in proportion to the benefit each receives. The user of the city plant and the general taxpayer should not be the only ones to pay. The landowner frequently benefits most of all, and he should pay his share of the cost also.

There is nothing new in the principle of benefit assessments. The communities already pay for their street openings by assessment. They pay for their sewers in the same way. In Kansas City the property benefited is assessed to pay for the parks. Under the conservancy law of Ohio the benefit assessment plan is applied to furnish the money to build flood-protection works to save the cities, towns, and countryside from damage and destruction. In Colorado, the Moffat Tunnel through the Continental Divide is being paid for by benefit assessments, and in Detroit the public voted nearly three to one to pay for its rapid transit lines under a benefit assessment financial plan.

—Daniel L. Turner, Consulting Engineer, State of New York Transit Commission, before the International Town, City and Regional Planning Conference, April, 1925.

A Supreme Court on the Civic and Social Values of Single-Family Residence Districts

THE recent momentous decision of the Supreme Court of the State of California in the Los Angeles case of "Miller v. Board of Public Works, etc." (69 Cal. Dec. 215) has already been mentioned briefly in THE AMERICAN CITY.* The following paragraphs from the opinion of the Court are here quoted as an exceptionally effective argument in favor of single-family residence restrictions in zoning ordinances:

"In addition to all that has been said in support of the constitutionality of residential zoning as part of a comprehensive plan, we think it may be safely and sensibly said that justification for residential zoning may, in the last analysis, be rested upon the protection of the civic and social values of the American home. The establishment of such districts is for the general welfare because it tends to promote and perpetuate the American home. It is axiomatic that the welfare, and indeed the very existence, of a nation depends upon the character and caliber of its citizenry. The character and quality of manhood and womanhood are in a large measure the result of home environment. The home and its intrinsic influences are the very foundation of good citizenship, and any factor contributing to the establishment of homes and the fostering of home life doubtless tends to the enhancement not only of community life but of the life of the nation as a whole.

"The establishment of single-family residence districts offers inducements not only to the wealthy but to those of moderate means to own their own homes. With ownership comes stability, the welding together of family ties, and better attention to the rearing of children. With ownership comes increased interest in the promotion of public agencies, such as church and school, which have for their purpose a desired development of the moral and mental make-up of the citizenry of the country. With ownership of one's home comes recognition of the individual's responsibility for his share in the safeguarding of the welfare of the community and increased pride in personal achievement which must come from personal participation in projects looking toward community betterment.

"It is needless to further analyze and enumerate all of the factors which make a single-family home more desirable for the promotion and perpetuation of family life than an apartment, hotel, or flat. It will suffice to say that there is a sentiment, practically universal, that this is so. But few persons, if given their choice, would, we think, deliberately prefer to establish their homes and rear their children in an apartment-house neighborhood rather than in a single-home neighborhood. The general welfare of a community is but the aggregate welfare of its constituent members, and that which tends to promote the welfare of the individual members of society cannot fail to benefit society as a whole.

"The entrance of one apartment house or flat into a district usually means the entrance of others, and while it may mean an enhancement of value of the adjacent property for the building of similar structures, it detracts from the value of neighboring property for home building. The man who is seeking to establish a permanent home would not deliberately choose to build next to an apartment house, and it is common experience that the man who has already built is dissatisfied with his home location and desires a change. In other words, the apartment house, tenement, flat, and like structures tend to the exclusion of homes. The home owner may move to another district, but this may not be sufficient solution to his problem, for if no protection can be given to strictly home districts—such as is contemplated by a comprehensive and properly constructed zoning plan—he may be forced by the ever-increasing encroachment of apartments and flats to relinquish, if not altogether abandon, the benefits emanating from a permanent home site.

"Of course, the establishment of exclusive residence districts does not mean that all members of a community will perforce be compelled to live in individual homes. It simply means that by a comprehensive zoning plan such uses will be segregated to districts best suited to their development, with benefit to their own locality and without detriment to the strictly home districts."

Broad Outlook of the California Supreme Court as to the Rightful Exercise of the Police Power Conferred Upon Municipalities

"In short, the police power, as such, is not confined within the narrow circumscription of precedents, resting upon past conditions which do not cover and control present-day conditions obviously calling for revised regulations to promote the health, safety, morals, or general welfare of the public. That is to say, as a commonwealth develops politically, economically, and socially, the police power likewise develops, within reason, to meet the changed and changing conditions. What was at one time regarded as an improper exercise of the police power may now, because of changed living conditions, be recognized as a legitimate exercise of that power."

*See Zoning Notes, by Frank B. Williams, page 589 of the May number.

[EDITORIAL NOTE.—For an article on "Progress of City Planning Law during 1924," by Frank B. Williams, see THE MUNICIPAL INDEX for 1925, pages 50-53.]

Chamber of Commerce Activities in Public Affairs

Civic Projects in Schenectady

SCHENECTADY, N. Y.—Standing at the entrance of the new $4,000,000 Western Gateway bridge at Schenectady is the new VanCurler Hotel, which has been erected largely through subscriptions of citizens at a cost of about $1,000,000. The hotel, which is named in honor of Arendt VanCurler, the original settler of the locality now named Schenectady, was opened on May 7 with fitting ceremonies by the American Hotels Corporation.

The new bridge and new hotel have transformed the western end of Schenectady at the point where traffic crosses the Mohawk River to proceed westward. The location of this bridge commands a view of the cut in the mountains which constitutes the western gateway of the country.

Photograph by courtesy of Walter H. Main

SCHENECTADY'S NEW HOTEL AND SITE OF ITS ANCIENT TAVERN

SCHENECTADY'S NEW GATEWAY ENTRANCE

The improvements at this end of the city contemplate the transformation of the triangular block which now stands before the hotel into a plaza, as indicated in the sketch, which shows the entrance to the bridge, with the new hotel at the left.

These improvements are among the latest evidences of a high degree of civic progress in Schenectady. The movement that resulted in the erection of the new hotel began in the spring of 1922, when the Schenectady *Union-Star* conducted a Civic Pride Campaign. Growing out of that in the fall of 1922, came the formation of the Schenectady Chamber of Commerce with more than 1,200 members. The erection of the new hotel became one of the major projects of the Chamber.

A number of other important civic projects are under way in Schenectady, notably the city plan. The City Planning Commission is now submitting the report of recommendations made by Harland Bartholomew, the noted city planner, of St. Louis. This plan calls for sweeping improvements in the layout and traffic of Schenectady. The immense area immediately contiguous to the city, with broad, sandy plains adapted to manufacturing sites, where three railroads intersect and afford wonderful possibilities for spur tracks, suggests a future industrial city here for which scientific development rather than haphazard growth should be provided. Schenectady is increasingly determined to control its own destiny along modern city planning lines. The completion of the new hotel marks a step in progress and in confidence.

WALTER H. MAIN.

A Barbecue to 4,000

VENTURA, CALIF.—The most successful event of its kind that ever took place in Ventura was the barbecue recently given to the oil workers of the Ventura Avenue Field, by the Ventura Chamber of Commerce in cooperation with owners of property and companies operating in this oil field. Assistance in preparing and serving the barbecue was given by members of the local Rotary, Lions and Elks Clubs. This entertainment was held in appreciation of the importance of the Ventura Avenue Field to the city and of the excellent work done by those employed there. The event also celebrated the bringing in of the largest flowing oil fields in the state.

The barbecue was served to the workers and their families from 12:30 to 6:30 in the evening. Talks were given by representatives of the Chamber of Commerce, the city, and the oil fields, and entertainment was provided by the Ventura Boys Band and the Shell Orchestra. During the afternoon the guests attended a ball game between the Long Beach Shell team and the Ventura team. In the evening the entertainment consisted of a band concert, a five-act vaudeville, and a grand ball.

The illustration shows some of the 4,000 guests enjoying the good things of the barbecue.

E. E. WIKER,
Secretary, Ventura Chamber of Commerce.

A Successful Exposition

CANTON, OHIO.—The impressive Exposition of Progress which has recently been brought to a close in Canton, after eight days of showing, was a far greater success than even the executive committee in direct charge had originally anticipated. It was fostered by and held under the auspices of the Canton Chamber of Commerce, and the executive committee was composed of a score of business and industrial leaders of the city. The great success of the Exposition was largely due to the complete cooperation of all persons connected with the undertaking.

ENTRANCE TO THE EXPOSITION OF PROGRESS IN CANTON, OHIO

Its purpose was to sell Canton to its citizens, and officials of the Chamber of Commerce have declared that this was thoroughly accomplished. The event also celebrated the passing of the 100,000 mark in Canton's population. Held in tented quarters because of its great size, the Exposition represented every phase of the business, industrial, and civic life of the community. It gave the people an idea of what is daily happening within the confines of the city. Canvas stretching a total length of 820 feet and ranging in width from 40 to 150 feet was required to house the displays and exhibits. Booths lined the entire tent, and a large automobile show occupied the arena in the center of the "big top."

A PORTION OF THE OIL WORKERS' BARBECUE, AT SEA SIDE PARK, VENTURA, CALIF.

A great civic parade preceded the dedicatory ceremonies on the opening evening. Two band concerts daily, special entertainment features at each session, and the elaborate displays attracted large crowds both afternoon and evening. On the entertainment program were style shows and fashion parades, popularity contests, a pet stock show, and musical features.

Canton has been given wide and favorable publicity through its Exposition. The city has been shown to be progressive and on the alert, with fine resources for future growth.

DALLAS L. HOSTETLER,
Publicity Manager, The Canton Chamber of Commerce.

Chamber of Commerce and Community Chest Summer Schools

Through the cooperation of universities and the national organizations in the chamber of commerce and community chest fields, summer school courses for executives in these fields will again be conducted this year at Evanston, Ill.; Palo Alto, Calif., and Columbus, Ohio.

At Evanston the National School for Commercial and Trade Executives will be held from July 20 to August 1, under the joint auspices of the Chamber of Commerce of the United States, the National Association of Commercial Organization Secretaries, the American Trade Association Executives, and Northwestern University. For the special benefit of those who have attended previous sessions, a number of entirely new courses have been planned. Greater attention than heretofore will be given to the problems of chambers of commerce having small staffs or serving the smaller communities. Details as to the program can be secured from John N. Van derVries, Secretary, Board of Managers, 10 South La Salle Street, Chicago. Other members of the Board of Managers this year are: F. Roger Miller, Chairman; R. B. Beach, Elliot H. Goodwin, Ralph E. Heilman, John Ihlder, James A. McKibben, S. C. Mead, Walter Dill Scott, and H. P. Sheets.

At Stanford University, Calif., the fifth annual Western School for Commercial Organization Executives will be held from July 5 to 11, inclusive. Special courses will be given in municipal problems, psychology, and public speaking. The usual seminars for advanced students in the fundamentals of chamber of commerce work will be held throughout the week. A special effort is being made this year to interest a larger number of secretaries from outside the state of California. For full information application should be made to Prof. Edwin A. Cottrell, Palo Alto, Calif.

The course of instruction in the principles and methods of community fund and welfare federation management given every summer by the Ohio State University, in collaboration with the American Association for Community Organization, will be held in Columbus from June 22 to July 31, inclusive. The program can be secured from the Association at 215 Fourth Avenue, New York.

A Proud Day for the Albany Chamber of Commerce

GOVERNOR ALFRED E. SMITH SIGNING THE BILL CREATING THE PORT COMMISSION IN WHOSE HANDS WILL LIE THE DEVELOPMENT OF ALBANY, N. Y., AS A SEAPORT. THIS MARKS THE FINAL STEP IN THE LEGISLATION NECESSARY FOR THE REALIZATION OF THE DEEPER HUDSON RIVER PROJECT, FOR WHICH $11,200,000 HAS BEEN APPROPRIATED BY CONGRESS

From left to right: Charles E. Reid, Executive Secretary of the Bronx Board of Trade, which for many years has worked for a Deeper Hudson River; Assemblyman Delbert C. Hall, of Albany, who introduced the bill in the Assembly; Corporation Counsel Major Gilbert V. Schenck, of Albany, who worked on the original draft of the bill; Mayor William S. Hackett, of Albany; Governor Alfred E. Smith; Albert E. Dale, City Editor, Albany Evening News, appointed by the Governor to serve on the Port Commission; Mrs. Florence E. S. Knapp, Secretary of State; State Senator William T. Byrne, who introduced the bill in the Senate; and Roy S. Smith, Executive Manager of the Albany Chamber of Commerce, which successfully backed the Deeper Hudson River project

Hints, Helps and Happenings

Death and Infant Mortality Rates Lower in Most States in 1924 Than in 1923

THE Department of Commerce announces that in 23 of the 29 states for which comparative figures are now available, the death-rates for 1924 were lower than for 1923. In fact, record low rates appear for the following 13 states: Connecticut, Delaware, Kansas, Kentucky, Maine, Massachusetts, Montana, Nebraska, Ohio, Pennsylvania, Vermont, Virginia, and Wisconsin. The 6 states having higher rates for 1924 than for 1923 are: California, Florida, Mississippi, Oregon, South Carolina, and Washington. The highest 1924 death-rate (22.1 per 1,000 population) is shown for the urban districts of Mississippi, and the lowest (6.5) for the rural districts of Montana.

For infant mortality rates, comparative figures are available for 25 states. Of these only 3 show higher rates in 1924 than in 1923. The highest 1924 infant mortality rate (121.6) appears for the urban districts of South Carolina, and the lowest (51) for the rural districts of Nebraska. Infant mortality rates are shown for both years for 44 cities of 100,000 population or more in 1920. For 36 of these cities, the 1924 infant mortality rates are lower than those of the previous year.

Roadside Refreshment Booths That Beautify the Highway

REALIZING that the roadside refreshment stand, equipped to care for the hungry and thirsty motorist, has come to stay, *House & Garden*, in a recent issue, has endeavored to show how simple a matter it is to make such booths beautiful, keeping in mind the fact that the structures should be no more difficult to build nor more expensive than structures of similar size put up offhand without plans carefully considered from practical and artistic points of view.

Three types of booths of distinct sizes, designed for *House & Garden*, by Lewis E. Welsh, architect, are suggested: type A, the smallest of the three, consisting simply of a store space and a counter; type B, a sketch of which is reproduced herewith, comprising an arbor, eating room and store space; and type C, the largest, containing a good-sized dining-room, a kitchen, and a terrace and arbor for serving.

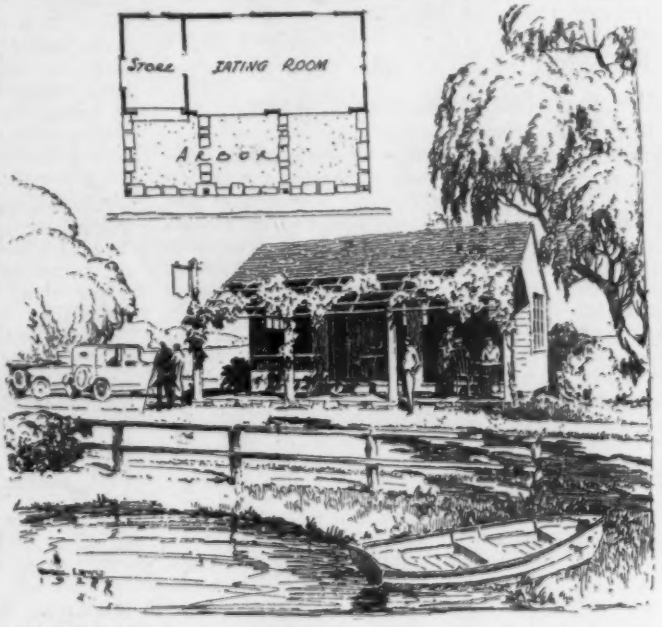
Any one interested in building these structures, either from the standpoint of the proprietor or from that of the community organization concerned with beautifying the highways, will be furnished with complete plans and working drawings of any or all of the three booths, without cost, upon application to the Town Betterment Editor, *House & Garden*, 19 West 44th Street, New York City.

Building Code Requirements for Live Loads

IT is recommended by the Department of Commerce Building Code Committee that the live load on floor space used for residential purposes in general be 40 pounds per square foot. For office space and assembly spaces not subject to standing crowds, 50 pounds is specified, and for other floor space in buildings for human occupancy the minimum limit is 100 pounds. This Committee was appointed by Secretary Hoover to draft recommended uniform requirements for building codes, and its report is presented in a 38-page pamphlet, "Minimum Live Roads Allowable for Use in Design of Buildings," published by the Bureau of Standards, in the Elimination of Waste Series.*

The investigation disclosed wide variation from the practice justified by actual conditions, with resultant waste in some cases and sacrifice of safety in others. The first part of the report describes the existing situation, the Committee's procedure, the source of information consulted, and the general considerations governing live load assumptions. The second part presents the minimum requirements recommended for adoption in state and city building codes, and the third describes the reasoning and summarizes the data on which the recommendations are based.

* Price 10 cents in currency or money order. Apply to Government Printing Office, Washington, D. C.



SUGGESTION FOR THE DESIGN AND PLAN OF A ROADSIDE REFRESHMENT BOOTH

Industrial or commercial buildings are to be designed primarily for the proposed occupancy, and data are given in the Appendix by which loads characteristic of different occupancies may be approximated. Roof and wind load requirements are somewhat less than present code practice, with emphasis on the influence of local conditions. Allowance is required in certain buildings for movable partition loads, and floor-to-floor reduction is permitted in transmitting the assumed live loads in high buildings to the footings. Provision is made for the posting of allowable loads in commercial and industrial buildings and for rigid inspection and regulation of occupancy change through requirement of occupancy permits. The Appendix gives extensive data on the live loads found in hospitals, schools, offices, assembly places, and commercial and industrial buildings for various purposes, including factories, warehouses, and garages. Results of impact due to moving crowds are also presented.

It is believed that the report contains the most extensive and reliable information on the subject of allowable live loads thus far printed, and the adoption of the recommendations should promote economy in building and increased safety to occupants.

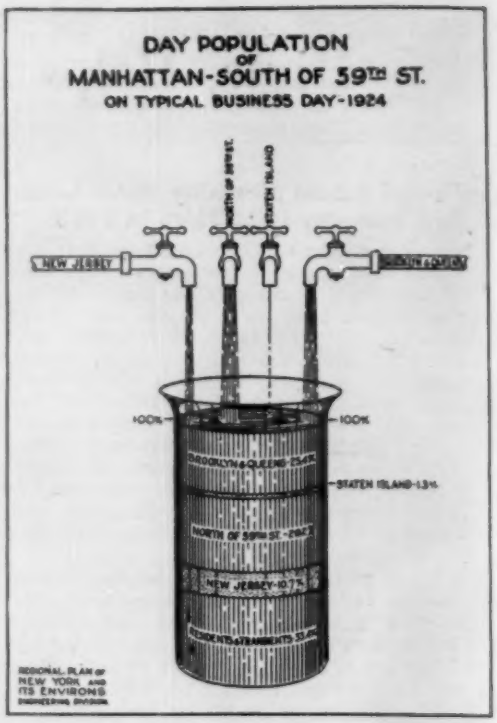
Lantern-Slides Available on Village and Town Planning

A SERIES of lantern-slides illustrating the planning of villages and towns for convenience, efficiency, health, and social well-being has been prepared by the United States Department of Agriculture for extension uses. It is entitled "Village and Town Planning—Series 161." Included in the 61 slides of the series are views of village outskirts, entrance and main streets, community buildings and grounds, examples of results from replanning, and similar subjects. Supplementary notes which may be used for discussion of the subject when showing the slides, accompany the set. These slides may be borrowed from the Department by writing the State Director of Agricultural Extension at the State College of Agriculture of any state.

Proposals for Traffic Relief in the New York Region

FORTY-THREE of the most important proposals made from official sources for the relief of the highway traffic situation in and around New York have been compiled by Harold M. Lewis, Executive Engineer of the Committee on Regional Plan of New York, as a framework for a comprehensive plan of street and highway development of the New York Region. The various proposals now grouped together for the first time, in a 125-page monograph by Mr. Lewis entitled "Highway Traffic in New York and Its Environs," include measures which have been suggested by officials and individuals to promote the free circulation of motor vehicles on the main avenues of New York and the thickly congested highways leading to and from the city.

The projects vary in magnitude from building bridges and vehicular tunnels between New York and New Jersey, removal of elevated structures and street widenings, construction of new parkways and main connecting highways, to the opening of a viaduct around the east side of Grand Central Station.



On the subject of traffic accidents the report says, in part:

"There were in the area of New York and Its Environs about 2,030 fatalities from motor vehicle accidents in the year 1923. With an estimated registration of 3,150,000 motor vehicles in the year 1935, the present danger hazard would probably result in about 5,400 fatalities during that year. It is interesting to note that the death-rate from motor vehicles in 1923 was five times as large as that from typhoid fever. It has long been recognized that expenditures of large sums of money for the elimination of typhoid fever are well justified, but people are only beginning to realize the importance of preventive work in connection with automobile accidents.

"Assuming the conservative cost for a life of $4,000, the estimated 1923 fatalities in the New York Region would represent a financial loss to the community of $8,120,000. This, capitalized at 6 per cent, would represent a total amount of more than $135,000,000. If it is possible to reduce the number of fatalities by any amount, say 20 per cent, this would mean that a corresponding percentage of the above sum could be expended in making physical improvements. The economic losses from deaths alone which could be averted by such improvements would justify a very considerable expenditure."

"Whatever may be done to improve traffic conditions it must always be remembered that restrictions which interfere with liberty to do what would be reasonable under normal conditions may be injurious to business and nothing more than a palliative. Wherever possible, a system of regu-

lation should be ancillary to city planning and not a substitute for it."

Several methods of immediate relief to traffic congestion are suggested in the report, among them being provision for proper parking and unloading, segregation of types of traffic, by-passing of congested centers, street widening or arcading at certain points, and a limitation of building bulk to conform to street capacity. The report also contains a summary of the most important proposals which have been advanced from other sources.

Copies of the monograph may be obtained from the Regional Plan of New York and Its Environs, 130 East 22nd Street, New York City.

Civic, Park and Planning Organizations Federate for Increased Efficiency

FOR more convenient and effective service to communities and individuals, a federation has been effected of five national organizations—The American Civic Association, The American Institute of Park Executives, The American Park Society, The National Conference on City Planning, and The National Conference on State Parks. As it is not the purpose of the Federated Societies to abolish any existing organizations or absorb their functions, each constituent organization will retain its own name, identity, membership, personnel, and program. Cooperation, not combination, is the keynote.

It is proposed that as soon as it can be arranged there shall be a common budget, common headquarters, and a library for the members of the organizations, where accurate and comprehensive information on the important subjects of planning and parks, whether national, state or municipal, can be secured. The constituent societies will maintain their present headquarters, but the general offices of the Federated Societies will be in Washington, D. C. The principal officers are: President, Frederic A. Delano; Secretary, Harlean James; Treasurer, George W. White.

City Planning Must Consider All Transportation Agencies

AT a round table discussion on traffic and transportation, held during the recent International Town, City and Regional Planning Conference, in New York, a resolution was adopted in which emphasis was given to the major importance of a comprehensive transportation policy in any well-considered city plan. It was voted to be the sense of the group:

"That the problem of traffic congestion and the development of adequate transport has become so involved that the approach to the solution thereto must be broadened to comprehend all the passenger and freight agencies contributing to or affected by transport and traffic—the automobile, the bus, street railway and rapid transit, motor trucks, commercial delivery, railroad terminals and port traffic, industry, the pedestrian; and

"That a traffic policy should be developed for early adoption (to be modified as time may require);

"That such development should proceed in careful recognition of the many related factors involved;

"That any traffic policy and plan should be an organic part of a comprehensive city plan;

"That such policy and plan should encourage higher efficiency and organization in traffic and transport;

"That the plan should include a program and budget for its consummation."

School Boards Elected by Proportional Representation in Scotland

IN March the Education Authorities—school boards, as we should call them—throughout Scotland were elected by proportional representation for the third time. In those cities of Scotland where there is a substantial Catholic minority the voters have naturally divided themselves in school matters more or less on religious lines. Under the proportional method of election the religious motives persist, of course, but the bitterness of the contests tends to disappear, for P. R. assures the control of the board to members elected by a majority of the voters, but it also assures proportionate or fair representation to substantial minorities.

Repair School Buildings in the Summer

IN reporting to the School Survey Committee of New York City the "low spots" in school work, teachers and principals have laid stress upon the importance of promoting teacher happiness at work and safeguarding teacher health. From all over the school system have come appeals for repairs to buildings during the summer, rather than when the schools are in session. It was stated that the health of teachers is not safeguarded when structural work is being done in the school building while school is in session. The strain imposed by such conditions is evident. Of course repairs to lighting equipment or to sanitary fittings should be immediate, but greater efficiency of school work would be promoted by having structural repairs and extensions and additions attended to when teachers and pupils are not present to be annoyed and distracted by the sounds and confusion of building. It has also been suggested that direct contact between those who inspect for repairs and the principal of the school would be much more effective in getting the right things done at the right time.

Other interesting points made in the report of the School Survey Committee may be obtained through a request to Dr. William H. Allen, who conducted the Constructive and Cooperative School Survey, as Chief Assistant of the Committee. Dr. Allen is Director of the Institute for Public Service, at 1125 Amsterdam Avenue, New York, N. Y.

American Municipal Officials Invited to Paris

As previously announced, an International Congress of Cities will be held in Paris, September 28-October 4, next. This important gathering of the city officials of the world is to be held under the auspices of the International Union of Cities and at the special invitation of the City of Paris, to which the French Government and the Department of the Seine have added their support and patronage.

By sending one or more delegates to this International Congress, American municipalities will not only benefit by an interchange of ideas among city officials from many countries of the world, but will have a part in developing plans for closer and more effective cooperation in future. The American City will be glad to send additional information to any one interested.

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The City's Legal Rights and Duties

Conducted by A. L. H. Street, Attorney at Law

The City's Surface Drainage Problems

OFTEN have the courts been called upon to consider the legal responsibility of cities for handling surface water in such way as to avoid inflicting injury to private property.

The opinions handed down in these cases appear to be substantially unanimous on the important declaration made by the Washington Supreme Court in the case of Wood vs. Tacoma, 119 Pacific Reporter, 859:

"It is now well established law in this state that damages cannot be recovered for consequential injuries to private property occasioned by the original grading of streets and alleys. The dedication of streets and alleys to the public use implies an agreement of the dedicator and his successors in interest that the city may establish grades and improve the streets and alleys thereto in aid of such use."

In Adams vs. Oklahoma City, 95 Pacific Reporter, 975, the Oklahoma Supreme Court decided that defendant was not liable for the flooding of abutting property in the making of a street improvement. A local statute providing for assessment of damages resulting from changes in established grades was treated as implying that there should be no liability for damage incident to improving a street or alley according to the grade first established. The Court remarked:

"There is good reason for the policy that cities should not be liable for damages occasioned in the first establishment of grades. . . . A building is placed upon a hill with a reasonable expectancy that a street is to be cut there, and that such building will in all probability be above the grade when established; and one is put upon a draw or low land with a reasonable apprehension that a street will be graded and filled, being raised at least to a grade far above its level. These are inevitable incidents of improvement, development, and progress. Otherwise, no cities could reasonably be built."

Said the West Virginia Supreme Court of Appeals in the case of Jordan vs. Benwood, 26 Southeastern Reporter, 266:

"A city is not liable for damages to a lot owner because change of grade of a street prevents surface water of the lot from flowing off. It is not different even if the surface water is, by reason of such change of grade, increased in quantity on the lot, if not cast in a mass or body on the premises. Nor is a city liable for mere surface water flowing from a street upon an adjoining lot."

Similar conclusions have been reached by the appellate courts of Arizona (202 Pacific Reporter, 230), California (30 Pacific Reporter, 798), Pennsylvania (63 Atlantic Reporter, 1073), Minnesota (20 Northwestern Reporter, 322), Iowa (18 Northwestern Reporter, 705), Indiana (48 Northeastern Reporter, 876), and New York (76 New York Reports, 60).

Liability for Injury if Street or Sewer Improvement Is Negligently Constructed

But what has been said is not to be interpreted as meaning that a city may gather surface water from considerable areas and discharge it upon private property to the material injury of that property in a way that would not result from mere improvement of a street to its established grade. And, as noted at pages 974-975 of [illegible] American Law Reports, there are several decisions to the effect that if a street or sewer improvement is *negligently* constructed, there is liability for injury to private property resulting from such negligence.

And, in the case of Johnson vs. White, 65 Lawyers' Reports Annotated, 250, the Rhode Island Supreme Court went so far as to decide that it is not conclusive against municipal liability for collecting surface water and casting it through a culvert or drain upon private property that an equal quantity of water would have flowed upon the land had natural surface conditions been left undisturbed. The Court said:

"No one has a right to collect surface waters in any considerable quantity upon his own premises and then turn the same in a concentrated form upon the premises of his neighbor in such a manner as to cause him damage. Not that an owner of land may not so change the grade or surface thereof as to cause surface water to flow in a different direction from what it did before the natural contour thereof was changed, for this such owner may lawfully do. But he may not collect and concentrate such water by means of drains or otherwise, and then turn it upon his neighbor's

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land in a volume. And the law doubtless is that a city has no greater power over its streets, in the matter of disposing of its surface water which accumulates thereon, than a private individual has in disposing of the surface water which falls or collects upon his own land. . . . A city 'cannot, under the specious plea of public convenience, be permitted to exercise that dominion, to the injury of another's property, in a mode that would render a private individual responsible in damages, without being responsible itself.' . . .

"We do not wish to be understood as holding that a town or city is liable merely because, in the construction or grading of a street or highway, surface water is thereby turned upon adjoining land, for such a result is inevitable, and is merely incidental to the making or grading of the street. It is only when, in connection with the doing of such work, the town or city collects the water in some manner, and then discharges it in a considerable volume upon the land of another, that it renders itself liable for the damages sustained thereby. In this connection we may observe that we fail to see that it is material whether the water thus collected would have flowed upon the plaintiff's land in a given case, or not, but for some artificial structure. For it is evident that, while a given piece of land may receive a large amount of surface water without injury thereto when it gently flows thereon from natural causes, . . . yet, when collected and discharged in considerable volume at a given point, it may become very destructive and injurious."

When Drains Are Inadequate

A particularly instructive opinion was handed down by the Minnesota Supreme Court in the case of Dudley vs. Village of Buffalo, 73 Minnesota Reports, 347. It distinguishes prior decisions of the same court which, at first blush, might seem to be in conflict with the conclusions reached in the cited case. In this case it appeared that the village had constructed drains along a street, but that they were insufficient to care for heavy flowage, resulting in overflow reaching plaintiff's near-by low land. The Court said:

"It is clear that the village is not liable for putting in the upper drain and thereby carrying the water across the street, because it did not gather the surface water and unnecessarily discharge it in a stream upon the plaintiff's premises where it did not naturally belong. . . .

"The improvement of the streets and the putting in of these drains by the village was a direct benefit to the plaintiff's premises, as they relieved them in a large part of the surface water naturally flowing upon them; and, if the defendant is liable at all in this case, it must be because it did not do more, and wholly relieve the premises at all times from the burden of surface water naturally resting thereon, by making its drains of sufficient capacity to secure such result. The law imposed no such liability upon the village. . . .

"The decisions of this court cited and relied on by the plaintiff in support of his claim of liability on the part of the village are not in point, for their facts clearly distinguish them from this case. They are cases where the municipality, by its street improvements, *unnecessarily* turned surface water upon the private premises where it did not naturally belong, or gathered it up by artificial means, and unnecessarily turned it upon such premises, in injurious streams, in greater volume than it would naturally have flowed thereon, or constructed sewers proper for carrying away the sewage of the city, and, by reason of the known inadequate capacity or want of repair of the sewers, the premises were flooded. . . .

"It is the misfortune of the plaintiff in this case that his land is a natural depository for surface water; and, if he wishes to keep the surface water from coming upon it, his remedy is to fill it. The village was not legally bound to construct its drains of adequate capacity to relieve his land of surface water, and, it appearing . . . that by no act or omission of the defendant village was any more surface water, or any greater volume, carried upon his premises than naturally belonged there, it is not liable in this case."

Items of Municipal Law

City Held Not Liable for Injury Caused by Defective Park Sidewalk

A city maintaining a park as a place of resort for pleasure and promotion of the public health is engaged in a governmental function in such sense as to be immune from liability for injury to a pedestrian, resulting from a sidewalk defect, holds the Georgia Court of Appeals in the case of Miller vs. Mayor, etc., of Savannah, 126 Southeastern Reporter, 867.

Municipal Power to Regulate Storage of Explosive Oils

Under statutory power to enact all such ordinances as may be expedient for maintaining the welfare of a city, the city council may regulate the manner in which kerosene and gasoline may be stored within the corporate boundaries. An ordinance forbidding the storage of such fluids (except in small quantities) otherwise than in tanks buried at least three feet underground, is not invalid on its face, and one who attacks it as unreasonable as applied to a particular state of facts has the burden of overcoming strong presumptions in favor of its validity. (Kansas Supreme Court, Cities Service Oil Company vs. City of Marysville, 231 Pacific Reporter, 1031.)

Porch Projecting into Highway Held to Be Abatable Nuisance

The right of county commissioners to require defendant to remove from the limits of a highway an obstruction consisting of a porch projecting from a building was upheld by the Maryland Court of Appeals in the case of County Commissioners of Carroll County vs. Rickell, 126 Atlantic Reporter, 711. In the course of its opinion, the Court remarked that "the control of the city over streets is attended with the duty of preserving them for their legitimate purposes, and the municipal authorities cannot divest themselves of this trust. . . . The encroachment upon a public highway is a public nuisance which may be abated by a mandatory injunction."

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Zoning Notes

Prepared by Frank B. Williams
Author of "The Law of City Planning and Zoning"
From data collected by the Zoning Committee of New York (233 Broadway)
Mr. Williams may be addressed in care of THE AMERICAN CITY, 443 Fourth Avenue, New York

Recent Zoning Ordinances and Enabling Acts

ARIZONA.—Statute passed March 24, 1925, in effect June 11, 1925; for the most part follows Model Act.

STONEHAM, MASS.—By-law, March 31, 1925.

NEW YORK.—Statute, April 8, 1925, amends General City Law by authorizing regulation of density of population.

RHODE ISLAND.—Statute, amending act authorizing town of Westerly to zone. The act grants to a zoning board, appointed by the town council, both zoning and platting powers; giving it the power of a board of appeals and allowing it to make exceptions to the zoning ordinance.

—Statute amending Revised Laws, 1923, authorizing cities to enact zoning ordinances; approved April 27, 1925.

Recent Zoning Decisions

KANSAS.—*West v. City of Wichita; Wiegand v. Same; Ware v. Same, Supreme Court, May, 1925.* The provision of a zoning ordinance prohibiting the construction of apartment houses in a district restricted to one- and two-family houses, churches, colleges, etc., is not unreasonable.

NEW JERSEY.—*Eaton v. City of Newark, Supreme Court, January Term, 1925.* Mandamus. Application for permit to erect thirty-two garages housing one automobile each, refused by the Superintendent of Buildings on the ground that such structures upon the premises in question would be in violation of the provisions of the zoning ordinance. A board of adjustment exists in the city, but the relator has not appealed to that Board from the ruling of the Superintendent of Buildings. *Held*, that the relator must exhaust the remedies through such agencies as the Legislature has set up for that purpose, before applying for the allowance of the discretionary writ of this Court.

NEW JERSEY.—*Sarg v. Hooper, Justice of the Peace of the Borough of Haworth, Supreme Court, January Term, 1925.* Conviction for erection and use of a refreshment stand and gasoline tank upon property on which, by the zoning ordinance, the erection and use of structures for business purposes is forbidden. There are no other buildings to the north as far as Haworth Drive, a distance of 150 to 200 feet, nor to the south for 300 or 400 feet; and the stand is 60 feet back from Washington Avenue, on which it fronts. *Held*, that the ordinance is unconstitutional as a deprivation of property without compensation and without due process of law. The Nutley case cited as controlling.

NEW YORK.—*People ex rel. Leverich Realty Co. v. Board of Appeals, Supreme Court*, reported in *New York Law Journal* of March 3, 1925, p. 2095. Under the rule laid down in People ex rel. Seigel v. Mann, 208 App. Div. 713, the Board of Appeals is without power or jurisdiction to entertain an appeal from the Tenement House Commissioner. This rule is not, however, applicable in a case like this, of an original application for a variation, conferred by the Building Zone Law. This is not an appeal, nor a review. The result is not a reversal but a granting of the application for the variation.

The evidence does not disclose any abuse of the discretion to exercise the power of the Board to grant such an application.

Recent Zoning Literature

Edward M. Bassett is conducting a "Zoning Round Table" in print, in *City Planning*, the official organ of the American City Planning Institute and the National Conference on City Planning, the first issue of which was published in April. Many of our readers are familiar with Mr. Bassett's tables for oral discussion of zoning problems at the sessions of the National Conference on City Planning, and will be glad to participate in the written discussions.

At the sessions of the International Planning Conference, held at New York the week of April 20, 1925, the following papers with regard to zoning were presented:

"Fundamentals of American Zoning with Special Reference to the Vital Importance of Court Review," by Edward M. Bassett.

"The Influence of Zoning on High Buildings and Street Traffic," by E. P. Goodrich.

"Zoning and the Street System," by Lawrence V. Sheridan and T. Glenn Phillips.

These papers will be printed in the annual volume of the Proceedings of the National Conference on City Planning.

An article entitled "New Court Decisions on Zoning," by Edward M. Bassett, will appear in the June issue of the *National Municipal Review*.

The May number of the *National Municipal Review* contains an article by Paul Studensky, Director of Research of the New Jersey State Chamber of Commerce, on the "Status of Zoning in New Jersey."

A most important contribution to the thought with regard to planning in this country, including zoning, is the pamphlet just issued by the Regional Plan of New York and Its Environs entitled "Planning of Unbuilt Areas in the New York Region," by Edward M. Bassett. The pamphlet consists of a proposed statute in which platting and zoning powers are to a certain extent united in the planning commission in order to obtain an added measure of flexibility so necessary in the planning of unbuilt territory; to which is added a general statement of the purpose of such a statute, and notes on various sections of it. The statute also aims to provide, automatically, for laying out small parks for playgrounds.

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The Municipal Bond Market

By Sanders Shanks, Jr.
Editor, *The Bond Buyer*

THE most notable indication of the present condition of the municipal market was predicated by the sale of $60,000,000 New York City bonds. The bonds bear interest at the rate of 4¼ per cent and were issued in three lots of 1- to 10-year, 1- to 15-year, and 1- to 40-year serial bonds. The successful group paid 102.3197 for the entire issue, which is equivalent to a net interest cost to the city of 4.045 per cent. This sale is the best that the city has negotiated since 1909. A few days after the sale of the bonds the successful syndicate reported the resale of the greater part of the issue.

While the demand for high-grade municipal bonds, which was light until a few weeks ago, is growing steadily, it is expected that the flotation of new issues during this year will be smaller than in recent years. Much of the borrowing during the past few years was to finance improvements that had been delayed because of the war. It is believed that most of this financing has been completed. It must also be remembered that over $300,000,000 bonds were issued during that period for the payment of a bonus to World War veterans and that only a few million bonds for this purpose remain unsold. An actual comparison of the first four months of this year with the corresponding period of last year shows a decrease of $22,313,051. No doubt, a greater decline will be shown by a similar comparison made at the end of the next four months' period.

There has been a tendency among underwriters during the last few years, owing to vast competition, to figure on a smaller margin of profit when bidding for new issues. Municipalities, naturally, profit greatly by this development. Only a few years ago dealers usually figured on a 2 per cent profit over the market value of the bonds. Today, in many instances, bids are made at prices that realize only three-quarters of one per cent profit to the dealers. Therefore, municipalities, in addition to enjoying a good market for their bonds, are also able to place their bond issues at a much lower interest cost.

The following list of bonds is characterized by the unusually high prices paid for the issues that were floated during the last month:

Amount	Municipality	Maturity	Int. Rate %	Net Yield %
$2,000,000	Stamford, Conn.....	1926-65	4¼	3.96
2,000,000	Louisville, Ky.	1965	4	3.97
1,050,000	Pittsburgh, Pa.	1926-55	4¼	3.98
1,000,000	Berks Co., Pa.....	1930-55	4	3.90
2,955,000	Boston, Mass.	1926-55	4	3.92
5,173,000	Cleveland, O.	1926-50	4¼	4.02
60,000,000	New York, N. Y.....	1926-65	4¼	4.04
1,000,000	Cook Co., Ill., Forest Preserve Dist.	1926-45	4	4.05
7,000,000	Alabama	1949-56	4 & 4¼	4.09
2,000,000	California	1927-46	4½	4.15
1,000,000	Portland, Ore.	1936-55	4	4.17
1,500,000	Jefferson Co., Ala...	1945-64	5	4.51
1,000,000	United States Philippine Islands	1955-35	5	4.66

EDITORIAL NOTE.—Readers are reminded that the term "municipal bonds" is used by Mr. Shanks in this department each month in the same sense as used by investment bankers—covering not merely issues by municipalities but all securities issued by states or any of their political subdivisions.

Parks and Forest Preserves—Distinctive Problems

IN the movement which is gaining increasing headway throughout the United States for adequate parks and forest preserves under national, state, or local control, the distinctive functions of the two kinds of reservations are not always borne in mind.

Parks have as their prime purpose the furnishing of opportunities for recreation and esthetic enjoyment. The function of forests, on the other hand, is primarily economic, and their establishment can be made a very important factor in the wise conservation of our natural resources.

In an outline prepared for the Board of Directors of the Friends of Our Native Landscape, the distinctive purposes of a park policy and of a forest policy for the state of Illinois were effectively presented. Jens Jensen says on state *parks:*

"The object of these reservations is to preserve the scenic beauty of Illinois in its primitive form and to keep it as a sacred heritage to unborn generations. There is an inherent quality of great force in this primitive beauty that is invaluable to mankind in inspiring his mind and in giving vigor to his body as well. It is a different world than the man-made one and there should always remain a distinct line sharply drawn between the man-made and the primitive world, the work of the Great Master. It is therefore as much from an ethical as from a purely recreational standpoint that state reservations should be created. Within these reservations should be preserved the flora and the fauna."

The purpose and objects of a *forest* policy are stated by F. W. Von Oven, in the same pamphlet:

a. To preserve the contours of the state against erosion.

b. To reestablish forests upon areas originally covered by native forests.

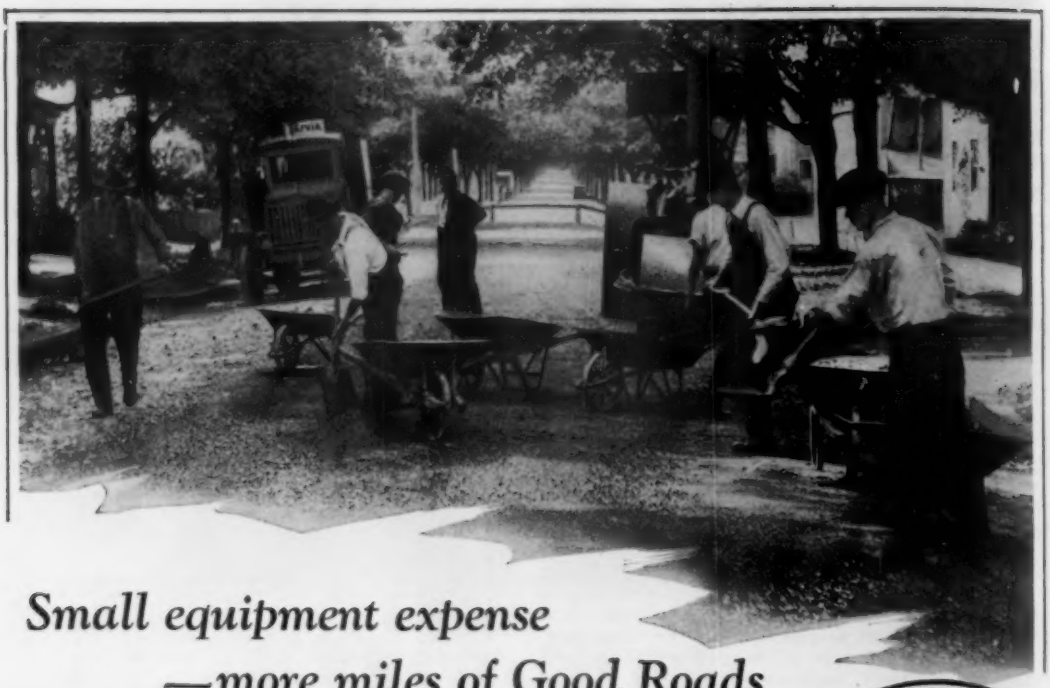
c. To insure against abnormal drought and serve as a protection against rapid run-off of rainfall.

d. Economic importance for the production of industrial working material and the by-products thereof for fuel or distillation.

e. To redeem lands now of low acreage value and correspondingly low tax-paying ability and make them profitable both for the owner and for the state.

f. To build up a progressive permanent timber and lumber production to be largely developed on lands especially adapted for forestry and of little value at the present time for tax revenue and of no particular value for agriculture.

g. To encourage wood lots in agricultural districts and the planting of trees of indigenous character on cut-over wood tracts, forest preserves, and park reservations for the preservation of such tracts with growths of their native trees and flora.



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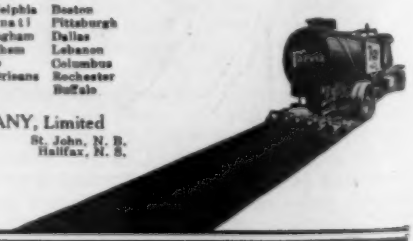

From the International Union of Cities

Items translated from "Tablettes Documentaires Municpales" by Stephen Child, 410 Maryland Building, Washington, D. C., to whom requests for further information regarding this source of civic documentation should be addressed

Town Planning at Oxford, England. 71.311 (42.57)

Raymond Unwin, who has recently been making plans for this ancient University city, recognizes the influence of its dual character—educational and commercial. He notes that four centuries before it was known as an educational center, Oxford was an important commercial community and was among the first six English towns of that epoch. However, since the early part of the thirteenth century the power and the authority of the University have continued to increase and for a long time the commercial development was very slight. It is only since relatively modern times that the city has recovered complete municipal autonomy, and happily there exists to-day close cooperation between the two elements. While insisting upon the value of these two factors, emphasis is laid upon the necessity of preserving the unique treasures of Oxford, to be found nowhere else, and of conserving the special character and spirit of the town. The various plans and projects proposed cover an area having a radius of three miles from the center of the town extending into the territory of several other smaller communities. Among many other features, it is proposed to reduce the traffic in the center of the town, emphasizing there the importance of quiet and dignity. Furthermore, the great advantages of decentralization are recognized and plans made to accomplish this purpose.

The Planning of Main Highways in Germany. 71.5

With the great increase in motor-driven vehicles, the problem of traffic management on the more important highways of German cities is becoming acute. It is being realized that systems of broad, straight streets with crossings at right angles present great danger. Experience shows that safety depends not upon the width of the street but upon the ability to see either way at the corners and chanves of direction. It is proposed to increase considerably the field of vision by means of adequate setback lines for the first floor of all structures, and by arranging for a more suitable alignment of buildings at such crossings and curves or changes of direction. Emphasis is laid on the fact that straight routes invite speed, while curving ones with restricted visibility call for slower progress. By employing such methods in the planning of main highways, a helpful, psychological influence is brought to bear on the drivers of vehicles.

Concert Hall and Baths, Newcastle, England. 72.58:574 (42.82)

The city of Newcastle has recently completed, at an expense of £150,000, a structure including not only a large concert hall, but two bathing pools, one for men and one for women.

City Planning in Morocco, French Africa. 71 (64)

Marshal Liautey has endeavored to preserve the old towns of Morocco while at the same time adapting to them as many as possible modern city planning methods, measures, and ideas. The realization of these ideas has been assigned to Henri Proust, and the results obtained in the last six years are remarkable. The city of Casablanca now has an admirable city plan completed by a very successful type of private architecture. The cities of Rabat, Meknes, and Fez furnish examples of well-conceived modern towns combined with older communities in which the picturesque conditions of earlier times have been respected and preserved.

Regional Planning About Milan, Italy. 71.31 (45.21)

The city officials of Milan have been obliged to prepare a general plan affecting eleven neighboring towns. The preliminary operations included a comprehensive map of the area showing existing conditions, utilizing in its preparation methods of aerial photography. This was followed by a careful study of the general principles involved in the preparation of the project. The general plans will, among other things, give suggestions as to the use of land in different districts.

Housing in the Ruhr District of Germany. 33.332 (43)

At the request of the Director of the Association of Housing Colonies of the Ruhr Basin, specialists have been studying methods of reducing the cost of house building. These studies have been grouped under the headings: materials; arrangement of lots; accessories; and financing. Emphasis is laid upon the necessity for a more rational policy on the part of the town in respect to prices to be paid for land. It is claimed the towns should seek to systematically encourage builders to hold lands conveniently located at a normal price. Among other matters, the importance of simplifying and reducing the costs of installing water-supply pipes and sewer connections has been emphasized.

Housing Policy in Holland. 33.332 (492)

The Minister of Labor of Holland has declared himself in favor of the sale of houses built under the régime of the housing laws of recent years. This attitude on the part of the Minister has been severely criticized. It is maintained by leaders in the housing movement in Holland that if there is one principle that is absolutely contrary to the spirit of the housing laws of that nation, it is that of the sale to individuals. A recent governmental regulation permitting second mortgages is also considered reprehensible, for the community which sustains half the risk has not the judgment, in regard to the solvency of the borrowers, to issue such mortgages. It is believed, however, that these methods will lead to the construction of a great number of houses.

The Heating of Houses in Germany. 66.297 (43)

Directions for the most economic methods of heating houses have recently been prepared by the Prussian Minister of National Prosperity. These directions are the result of the most profound examination of economical heating arrangements, of methods of construction, of varieties of material, of installation of chimneys, and of heating and cooking apparatus. Methods of securing the most complete utilization of fuel have resulted in great economy.

Use of Cinders in House Building in Belgium. 69 (493)

It has been found in Belgium that weak concrete poured in molds is applicable only when houses can be built in large numbers. The employment of a process involving two methods—exterior walls of ordinary burnt-clay brick, and interior walls of cinder-bricks—permits an economy of from 800 to 1,000 francs per house, and, besides this, the cinder block presents certain technical advantages. These cinder bricks are prepared in a proportion of 8 parts of crushed cinders to 1 part of cement; that is, 1/9 of its volume or 1/7 of its weight is cement.

England's Housing Program. 33.332 35 (42)

As in the majority of European countries, England has endeavored to encourage building by government aid. During the last year new laws have been enacted to help relieve the housing shortage, authorizing an enormous program. A National Housing Committee was appointed by the MacDonald Government, composed of representatives of the building constructors, the building workers, and the Ministry of Labour. This committee presented to Parliament a detailed report on the conditions of the housing industry. The report advised the determination upon a program of construction extending over fifteen years, and involving the building of 2½ million houses. The Minister of Public Health has announced his approval of the recommendations of this report and hopes through the realization of this vast program to put an end to the housing shortage and also to help abolish the slum. Parliament has passed the Housing Financial Provision Bill and has increased the appropriations for lodgings. Towns and cities will be asked to help finance the building projects.

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Regional Planning.—The *Survey Graphic* for May, 1925. 78 pp. Illustrated. Published monthly. $3.00 a year. Apply to Survey Associates, Inc., 112 East 19th St., New York, N. Y.

The Survey has opened its pages to the Regional Planning Association of America, in connection with the International Town, City and Regional Planning Conference, held in New York April 20-25. The valuable material is presented in a very effective way, with telling illustrations. It includes: The Fourth Migration ("providing an adequate 'human plant' for the community at large"), by Lewis Mumford; Dinosaur Cities (they fail because they are too big), by Clarence S. Stein; New York Today and Tomorrow (from the studies of the Russell Sage Foundation); Our Stake in Congestion, by Frederick L. Ackerman; Coals to Newcastle (uneconomical national marketing), by Stuart Chase; The New Exploration (Charting the Industrial Wilderness), by Benton Mackaye; Seeing a State Whole, by Governor Alfred E. Smith; Giant Power—Region-Builder, by Robert Bruère; The Road to Good Houses, by Henry Wright; New Towns for Old (garden cities), by C. B. Purdom and Alexander M. Bing; Two-Generation Communities, by Joseph K. Hart; and other articles.

The Water Supply of Buildings and Rural Communities.—By Walter S. L. Cleverdon, Associate Professor of Sanitary Engineering, New York University; formerly Assistant Engineer, Department of Water Supply, Gas and Electricity, and the Board of Water Supply of New York City. D. Van Nostrand Co., New York. 1925. VIII + 186 pp. Tables, diagrams, illustrations. $2.50.

The author, very happily, does not try to present a complete treatise on all types of water-supplies, but confines himself to the necessary details for the delivery of water for buildings and rural communities. The subject of large distribution systems for cities and towns has not been treated, although it is referred to and explained in the text where it applies to the subject matter. The various subjects are taken up in the order in which they usually present themselves in actual practice, and the work is visualized by diagrams and tables. Computations requiring knowledge other than plain arithmetic have been omitted, and instead tabulated results have been prepared to furnish the data required. The various chapters treat the question of supply and consumption, including types of supplies, pumps, meters, house services, roof tanks, and hot-water supplies, suggestions for laying out and installing small water-supply systems, information for owners and superintendents, and a chapter on the maintenance of the small water-supply.

A Compendium of Reports and Studies Relating to the Commerce and Industries of Boston.—Compiled by William A. Leahy, under the direction of the City Planning Board, Boston, Mass. 1924. XIV + 357 pp. Map of historical Boston. Apply to the City Planning Board.

This volume indexes and condenses the best of the material in more than 150 reports published since 1844, including publications of the federal, state and city governments, with those of organizations and individuals referring to the commerce and industries of Boston, and many on related subjects. Among the writers of the reports are engineers, architects, merchants, manufacturers, executives, legislators, traffic experts, economists, labor leaders, publicists, and professors, differing in their view-points and opinions, but, it is believed, all animated by a common sense of civic responsibility.

County Library Service.—By Harriet Catherine Long. American Library Association, Chicago. 1925. 206 pp. Illustrated. $1.75.

As the best means of developing public library service within a state, the county library system is worthy of careful study. This volume gives a fascinating presentation of the need and demand for such service in rural counties, and of the way in which county library systems have been developed and made to meet definite wants. It is also a working manual of organization and administration, methods and records. Two of its most interesting chapters are those on The Book Automobile, and The County Library and the Schools. A comprehensive bibliography is included.

Kansas City's Proposed New Building Code.—Given in 2-page installments in "The Builder," beginning March 20, 1925, published by The Builders' Association of Kansas City, Room 225, Railway Exchange, Kansas City, Mo. (Apply to the publishers.)

Municipal Budgets and Budget Making.—By A. E. Buck, of the National Institute of Public Administration, New York Bureau of Municipal Research. Published by the National Municipal League, 261 Broadway, New York, N. Y. 1925. 77 pp. $1.50.

The first of the National Municipal League Monograph Series dealing with the technical phases of local government and administration. It covers the principles of sound budget procedure, with the purpose of aiding city officials in charge of this work. The eight chapters are as follows: The Budget and Budget-Making Organization; Character and Classification of Budget Information; The Budget Estimate Forms; Preparation and Revision of the Budget Estimates; The Form and Contents of the Budget; Appropriation, Revenue and Borrowing Measures; Legislative Consideration and Action on the Budget; Administration of the Budget Plan. The Appendix contains topics for discussion and reports. This is a clear, direct, interesting text-book on the financial planning division of city administration.

Child Hygiene.—By S. Josephine Baker, M. D., Dr. P. H., Consulting Director, United States Children's Bureau; Consultant in Child Hygiene, United States Public Health Service and New York State Department of Health. Harper & Brothers, New York. 1925. XII + 534 pp. Drawings, charts, tables. $5.00.

This is one of the volumes of Harper's Public Health Series, edited by Dr. Allan J. McLaughlin, of the United States Public Health Service. It is written to interest and inform intelligent citizens who control public opinion. To that end, it tells in straightforward fashion what has been done in this country by legislative action and by investigation through commissions and other organizations to protect child health, to reduce infant mortality, and to guard the safety and rights of children. It makes clear the community and individual conditions that make for disease and death in the early years of life, and shows what is being done and what still needs to be done to overcome these conditions. The book should be in the hands of civic workers and community officials everywhere, since it deals comprehensively and definitely with the most important facts relative to community life.

Highway Traffic in New York and Its Environs.—By Harold M. Lewis, in collaboration with Ernest P. Goodrich, including a program, by Nelson P. Lewis, for a study of all communication facilities within the area. Engineering Series Monograph Number One, published by the Regional Plan of New York and Its Environs, 130 East 22nd Street, New York, N. Y. 1925. 128 quarto pp. Maps, drawings, charts, tables. This report is the result of more than two years' intensive study of the highway problem caused by the growth of traffic in the New York Region. An increase in the number of motor vehicles registered in New York City alone to about 2,260,000 is predicted by the year 1965. See item on page 688 of this issue. (Apply to the publishers.)

Salary Scale and Working Conditions of Fire Fighters in the United States and Canada.—Data on these subjects are given in the March, 1925, issue of the International Fire Fighter, the official organ of the International Association of Fire Fighters, published at Room 106, A. F. of L. Building, Washington, D. C. The salary tables cover 8 pages and present facts regarding 187 cities, of populations varying from New York's 6 millions to the 8,000 of Walkerville, Ont. The number of men in each fire department is given, and the salaries of the chief, deputy and battalion chiefs, captains, lieutenants, firemen in first, second, third and fourth years, master mechanic, engineers, chauffeurs, electrician, fire-alarm operator, and secretary to the chief. The tables of working conditions cover 158 cities, telling the number of men and of stations; whether or not the two-platoon system is in service, how it was or may be obtained, and other facts regarding it; the hours on day and on night shift; how often the shifts alternate; days off and days annual vacation; salary allowed for injury and for sickness; and clothing allowance by city. (Apply to the magazine.)

A Catechism of Zoning.—By Adolph Grant, Chairman, Zoning Commission, New Rochelle, N. Y. Published by the New Rochelle Chamber of Commerce, in order to give the citizens a better understanding of the principles which determine zoning regulations. 1925. 8 pp. (Apply to the Chamber.)

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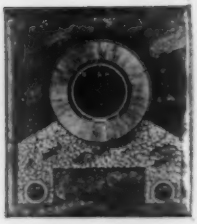

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City and Regional Planning and Zoning.—A notable series of papers on various phases of planning and zoning were presented at the International Town, City and Regional Planning Conference, held in New York, April 20-23, 1925. For copies of these papers in pamphlet form or in the Proceedings of the Conference, soon to be published, application should be made to Flavel Shurtleff, Secretary of the National Conference on City Planning, 130 East 22nd Street, New York City.

Some Preliminary Observations from a Study of Water Filtration Plants Along the Ohio River.—By H. W. Streeter, Sanitary Engineer, United States Public Health Service. Reprint No. 987 from the Public Health Reports, January 30, 1925. 12 pp. Charts, tables. The actual performance of ten municipal filter plants of the rapid sand type, taking their raw water-supplies from the Ohio River, was studied by the United States Public Health Service in 1924, and this report of the preliminary analysis of the data was presented at the Fourth Ohio Conference on Water Purification, held in Cincinnati November 14, 1924. "Serious attention must be given to some plan for restricting further increase in sewage pollution of the river." (Apply to the Government Printing Office, Washington, D. C.)

International Federation for Town and Country Planning and Garden Cities.—Special Report No. 1 on International Notation for Civic Surveys and Town Plans. 4 pp. with insert giving the notation in colors recommended by a subcommittee of the Federation to provide an internationally understood method of indicating on maps and plans existing conditions and proposals for public and private open spaces, permanent allotment gardens, and industrial, commercial, and residential areas. (Apply to the Federation, 3 Gray's Inn Place, London, W. C. 1, England.)

Clean Up & Paint Up Blue Book.—How 7,000 Cities and Towns Were Made Beautiful—Sanitary—Safe.—Issued by the National Clean Up and Paint Up Campaign Bureau, St. Louis, Mo. 34 pp. Illustrated. Telling how cities have cleaned up and how such campaigns may be planned and carried out. It makes an appeal to mayors, health officers, street departments, fire departments, chambers of commerce, civic organizations, schools, and citizens in general, and gives definite information on getting everybody interested and at work, the Bureau cooperating if desired. (Apply to Allen W. Clark, Chairman of the Bureau, 3713 Washington Avenue, St. Louis, Mo.)

A Welfare Council for New York City.—Conclusions and recommendations of the Coordination Committee, organized by "Better Times" at the conclusion of its prize contest for the best plans for the further coordination of charitable and social work in New York City. This report was submitted at the Fifth Anniversary Dinner of "Better Times" on April 2, 1925. 13 pp. In the opinion of the Committee, the objectives of any comprehensive coordination movement in New York City may be grouped in five categories: better factual basis for community planning; better team work among the social agencies; better standards of social work; better public understanding of social work; better support of social work. Steps have been taken to create the Welfare Council of the City of New York, and the first Board of Directors has been appointed, as announced in this report. (Apply to George J. Hecht, Secretary, The Coordination Committee, Care "Better Times," 100 Gold Street, New York, N. Y.)

Relation of Park Planning to City and Regional Planning.—By Frederick Law Olmsted. An address given at the Joint Conference of the American Institute of Park Executives and the American Civic Association, in Washington, D. C., in October, 1924. Reprint from Parks and Recreation, official publication of the American Institute of Park Executives, January-February, 1925. 7 pp. "Merely because park system planning and city or regional planning overlap and interlock is no reason for confusing them or attempting to consolidate them." (Apply to Parks and Recreation, Rockford, Ill.)

Wages and Hours in Municipal Employment in Massachusetts.—In the Monthly Labor Review for April, 1925, published by the U. S. Bureau of Labor Statistics, Washington, D. C., 24 pp. of tables presenting data collected by the Division of Statistics as to wage rates and hours of labor, on July 1, 1924, of the employees of 63 municipalities in the state having a population of more than 10,000. 15 cents. (Apply to Government Printing Office, Washington, D. C.)

Assessors Manual, Minnesota.—Including Assessment Laws, with Questions and Answers Relating Thereto. Issued by the Minnesota Tax Commission, State Capitol, St. Paul, Minn. 1925. 117 pp. (Apply to N. A. Nelson, Secretary of the Commission.)

Les Sciences Administratives.—Numbers 1 and 2, January and February, 1925, of a new international review, published by the International Union of Cities with the cooperation of the permanent Commission of the International Congress of the Administrative Sciences and the International Institute of Bibliography and Documentation. This first issue reports the Conference of the Union which was held at Bale last December, and the Second International Congress of the Administrative Sciences, held in Brussels in 1923. The publication contains as a regular feature "Tablettes Documentaires Municipales," at first published as a separate bulletin. Students of state and city government, city officials, and civic workers will find the magazine a means of keeping in touch with methods and practices in administration. (Apply to Les Sciences Administratives, 3bis rue de la Régence, Brussels, Belgium.)

Municipal Planning, Park and Art Administration in American Cities.—Bulletin of the American Civic Association, Series III, No. 1, May 1, 1925. Collated from over 200 replies to a questionnaire sent out by the Association. 62 pp. The information is given under the names of the cities arranged alphabetically, and shows the machinery by which each city exercises control over the physical features of its development. 50 cents. (Apply to American Civic Association, Union Trust Building, Washington, D. C.)

Fire Prevention and Protection in Department Stores.—Fire Prevention Bulletin Number Sixteen of the Insurance Department of the Chamber of Commerce of the United States. 4 quarto pp. Showing the fire loss record for department stores in 1923, and making recommendations as to construction, exit facilities, the elimination of all hazards, and measures of fire-fighting. (Apply to Insurance Department, Chamber of Commerce of the United States, Washington, D. C.)

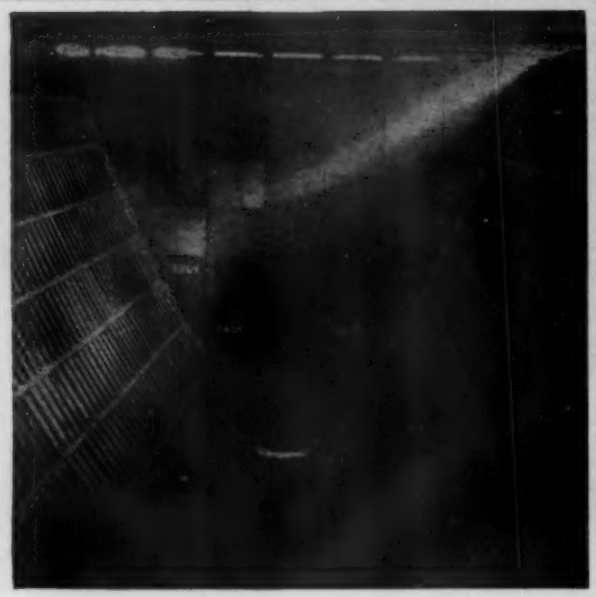
The Need for Preparing Children for Summer Vacation Hazards.—In The Bulletin of Safety Education for April 15, 1925, published by the Education Section of the National Safety Council. 6 pp. Children can be helped to have a vacation "unspoiled by the tragedy and pain of accident, by getting them interested in worth-while occupations and by pointing out to them the particular hazards connected with most summer sports, together with the right way to deal with such hazards." (Apply to Education Section, National Safety Council, 120 West 42nd Street, New York, N. Y.)

—The Sanitary District of Chicago.—Facts Demonstrating The Sanitary District of Chicago's Need of and Right to the Diversion of Necessary Water to Protect the Lives and Health of Its 3,500,000 Citizens and other Millions of People having Social and Business Relations with them. Submitted April, 1924, to the Committee on Rivers and Harbors, House of Representatives, Sixty-eighth Congress—First Session, by The Sanitary District of Chicago, a Municipal Corporation, Organized Under the Laws of the State of Illinois. Published April, 1924. 82 pp. (Apply to William J. Healy, President, The Sanitary District of Chicago, Chicago, Ill.)

Building Exits Code.—Advance publication of the Report of the Committee on Safety to Life as to a tentative Building Exits Code, including other provisions for safety of occupants in case of fire (hospitals, fire-drills, stairway enclosures). Published by the National Fire Protection Association, 40 Central Street, Boston, Mass., for consideration at the annual meeting of the Association, May 12-14, 1925. 20 pp. (Apply to the Association.)

Housing and Regional Planning in New York State.—Report of the Commission of Housing and Regional Planning to Governor Alfred E. Smith and to the Legislature of the State of New York, March 6, 1925. Legislative Document (1925) No. 91. 70 pp. Charts, tables. Presenting facts regarding housing conditions in New York City and the results of an inquiry into the field of housing construction, with an analysis of the basic costs of land and building. The regional planning work of the Commission is also described, as well as the service rendered in the past year to municipalities and county governments in the state. (Apply to George Gove, Director, Bureau of Housing and Regional Planning, 949 Broadway, New York, N. Y.)

Rural Highway Mileage, Income, and Expenditures 1921 and 1922.—By Andrew P. Anderson, Highway Engineer, Bureau of Public Roads. Bulletin No. 1279 of the United States Department of Agriculture. March 14, 1925. 88 pp. The present survey is the first attempt to gather definite information both as to the sources from which highway funds are secured and the purposes for which they are paid out. 15 cents. (Apply to the Government Printing Office, Washington, D. C.)



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Thumb Nail Analysis of the Electric Light and Power Industry.—Published by The Beeler Organization, 52 Vanderbilt Avenue, New York, N. Y. A brief analysis of representative electric light and power companies, presenting vital operating and financial statistics, grouped in accordance with the geographical districts of the American Institute of Electrical Engineers. 24 pp. Tables. Of interest to city officials and other public authorities. (Apply to the publishers.)

City Health Work.—Appraisal Form for City Health Work (for experimental use by city health officers); March, 1925. 37 pp. Schedule for Health Survey of Cities; 27 mimeographed pp. See item on "Appraisal Form for City Health" on page 616, in this issue. (Apply to American Public Health Association, 370 Seventh Avenue, New York, N. Y.)

Dramatics in Camp.—A mimeographed bulletin of 8 pp. on an important feature of summer camp life, issued by the Playground and Recreation Association of America, 315 Fourth Avenue, New York, N. Y. The answers to a questionnaire sent out to camp directors indicate that stunts, pageants, and very short plays are the most popular forms of dramatics in camp. Twelve successful stunts are described, and a valuable bibliography of applicable dramatic material is given, with the addresses of the publishers of the material. (Apply to the Association.)

The State Highway System of California.—Report of a study of the system, made by the California Highway Advisory Committee and submitted February 20, 1925. 111 quarto pp. Maps, charts, tables. A full and thorough account of the history, construction, financing, and traffic use of the state highway system. A compendium of the engineering, economic, and financial features of this department of the state administration. (Apply to the State Highway Commission, Sacramento, Calif.)

Salaries of Police and Fire Departments in Wisconsin Cities, 1924.—Compiled by Catherine Oppel, Assistant and Librarian, Municipal Information Bureau, University of Wisconsin, Madison, Wis. Information Reports No. 41 and 42 (December, 1924), of the Bureau, 13 and 15 mimeographed pp., respectively. Questionnaires calling for the data were sent to the chiefs of all the police and fire departments in the state. The fire department information shows whether or not the cities have adopted the double-platoon system. (Apply to Ford H. MacGregor, Chief of the Bureau.)

Legislation Against Fireworks.—8 pp. in the April, 1925, issue of the Quarterly of the National Fire Protection Association, 40 Central Street, Boston, Mass. A summary by states, with introductory comment, of the laws regulating or prohibiting the use of fireworks. Map showing the extent of state legislation. (Apply to the Association.)

Crime Waves and Criminals.—An Outline of Social Divergence and Abnormality. A selected list of books to be found in the St. Louis Public Library. Compiled by Lucius H. Cannon, Librarian, Municipal Reference Library, St. Louis. April, 1925. This bibliography is an attempt to show how man becomes a degenerate through the processes of Society itself, and how Society corrects and cures its and his mistakes. 24 pp. 10 cents. (Apply to the Municipal Reference Library, 211 City Hall, St. Louis, Mo.)

Directory of Agricultural and Home Economics Leaders, United States and Canada.—Seventh edition. 1925. Published annually in the spring, with supplements during the year. Official directory of the Agricultural Extension Service executives and personnel, including county agricultural agents and Home Economics teachers; combined with the Directory of Vocational Teachers, covering agriculture, home-making, trades, and industries in the United States. Published by William Grant Wilson, 51 Chestnut Street, Cambridge, Mass. 932 pp. Subscription, with supplements, $10. (Apply to publisher.)

Key to Atlanta.—Prepared and issued by the Industrial Bureau of the Atlanta Chamber of Commerce, 1925. A résumé of the recently completed survey of Atlanta and its environs made by Lamar Lyndon, consulting engineer. The survey proper covers 62 subjects. 40 quarto pp. Views, maps, tables. Statistics on the location, climate, topography, advantages, facilities, and governmental administration of Atlanta. (Apply to the Industrial Bureau of the Chamber.)

Recreation Training School of Chicago.—Announcements for 1925-1926. 24 pp., with 8-page announcement of the Summer Term of the School, July 20—August 22, held at Camp Gray, Saugatuck, Mich. The courses offered by the School are described, and the details of requirements and expenses are given. (Apply to the School, at 800 South Halstead Street (Hull-House), Chicago, Ill.)

Regional Planning Progress.—Mimeographed bulletin issued at approximately monthly intervals by the Chicago Regional Planning Association, Burnham Building, Chicago, Ill. A single sheet; 2 pp. Dealing with such phases of the larger subject as highways, water transportation, water-supply, sanitary measures, and zoning. It is hoped later to make this a printed, illustrated sheet. (Apply to Robert Kingery, Secretary of the Association.)

How to Organize a Boys' Community Baseball League.—By George D. Elwell, President, Twilight Recreation Committee, Albany, N. Y.; President, Fort Orange Council, Boy Scouts of America; Chairman, Recreation Committee, Albany Chamber of Commerce. 14 pp. Pocket size. Outlining the steps for organizing and carrying on a boys' baseball league in a community; based on the experience gained by the writer in connection with the Albany Twilight League, which is beginning its fifth season, having grown from 8 teams to 44 with an enrollment of about 800. Practical and intensely interesting. (Apply to the author, who is President and General Manager of the League.)

Why the Utilities Win: Sidelights on the Denver Tramway Case.—A Personal Statement by Delos F. Wilcox. Issued by the author, 436 Crescent Street, Grand Rapids, Mich. February, 1925. 30 pp. A review of the well-known rate case in Denver in which the testimony of Dr. Wilcox, the city's consultant, was excluded and the testimony offered by two company representatives was accepted. (Apply to the author.)

Child-Welfare Magazine.—The May, 1925, issue is dedicated not only to child health, but to better homes. Ten of the articles in this number have been prepared under the direction of James Ford, Executive Director of Better Homes in America, 1653 Pennsylvania Avenue, Washington, D. C. Secretary Hoover contributes an article on Home Training and Citizenship; John Ihlder, Manager of the Civic Development Department of the U. S. Chamber of Commerce, writes on The Home and the Neighborhood; and there is an article on Housing Standards by John M. Gries and James Spear Taylor, of the U. S. Department of Commerce. The annual subscription to the magazine is $1.00; in Canada, $1.25; in foreign countries, $1.50. Single copies, 10 cents. (Apply to Child-Welfare Magazine, 5517 Germantown Avenue, Germantown, Philadelphia, Pa.)

Projected System of Through Trails in New England.—Publication No. 13 of the New England Trail Conference. 1925. Folding map showing trails maintained by organizations; trails open but not maintained; projected through trails scouted; through trail links not yet scouted; and regions with numerous local trails. (Apply to Arthur C. Comey, Secretary-Treasurer of the Conference, Harvard Square, Cambridge, Mass.)

The Sanitary District of Chicago.—Report of the Engineering Board of Review of the Sanitary District of Chicago on the Lake Lowering Controversy and a Program of Remedial Measures. Part II: The Technical Bases for the Recommendations of the Board of Review. January 23, 1925. 109 pp. Maps, charts, diagrams, tables. The material in this report is presented under the following divisions: The Problem of the Chicago Drainage Canal; Descriptive and Historical; What the Drainage Canal Has Accomplished; Sewage Disposal; Program for Construction; The Great Lakes and the Regulation of Their Levels; Navigation; Water Power. (Apply to Engineering Board of Review, The Sanitary District of Chicago, Chicago, Ill.)

Act Relating to Municipal Employees' Annuity and Benefit Fund of Chicago.—As amended 1923. 71 pp. (Apply to the Municipal Employees' Annuity and Benefit Fund of Chicago, Room 1005 City Hall, Chicago, Ill.)

Municipal Reports

CHICAGO, ILL.—Annual Report, Bureau of Recreation

FREDERICKSBURG, VA.—Annual Report, Fiscal Affairs, 1924

GRAND JUNCTION, COLO.—Report of the Municipal Activities for the First Three Years Under the Council-Manager Form of Government, 1922, 1923, 1924

NEW YORK STATE.—Annual Report, 1923

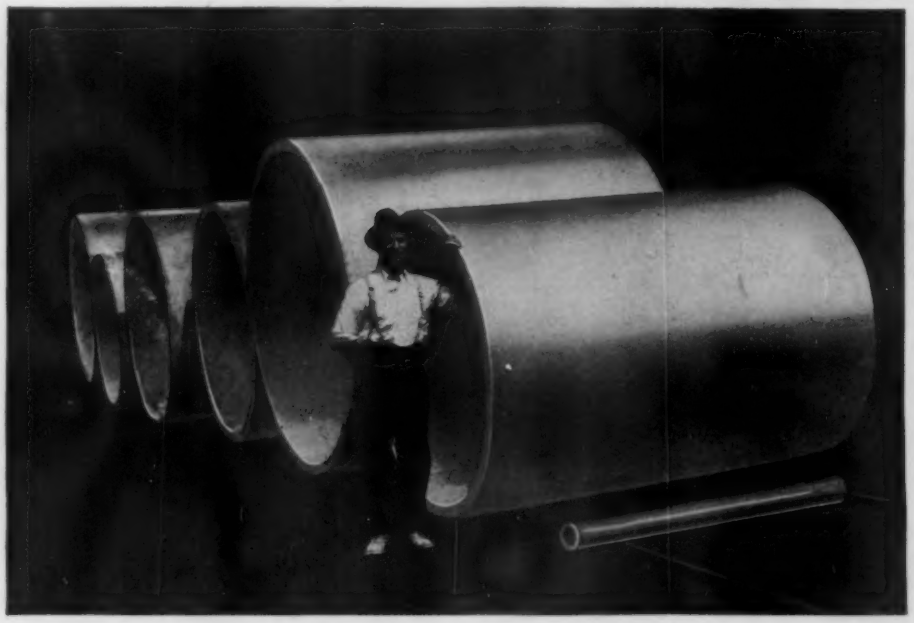
ST. PAUL, MINN.—Annual Report, Civil Service Bureau, 1924

SALT LAKE CITY, UTAH.—Annual Report, City Engineer, 1923

SEATTLE, WASH.—Annual Report, Department of Streets and Sewers, 1924

WESTERVILLE, OHIO.—Annual Report, City Manager, 1924

WESTMOUNT, CANADA.—Annual Reports, year ending October 31, 1924



Announcing
The Hume Centrifugal Process

An economical method of molding concrete by centrifugal action—an established success in other countries—now available to America.

By this process reinforced concrete pipe varying in size from 4 inches to 8 feet in diameter can be made—pressure up to 200 pounds per square inch—perfect density, non-porous and low cost.

Hume Pipe plant in operation at Detroit. We invite inspection and correspondence with parties interested in securing territorial rights.

Hume Process Makes:

Water Mains
Culverts
Sewers
Irrigating Pipe
Drains
Oil Mains
Electric Conduits
Septic Tanks
Fence Posts
Columns for Buildings
And many other articles

American Hume Concrete Pipe Company

UNITED SAVINGS BANK BUILDING

DETROIT, MICHIGAN

American Owners and Licensees of Patents for the manufacture, sale and distribution of Hume Centrifugally made reinforced Concrete Pipe and Hume Pipe Manufacturing Machinery.

On the Calendar of Conventions

JUNE 2-4.—SYRACUSE, N. Y.
Conference of Mayors and Other City Officials of the State of New York. Annual meeting. Secretary, William P. Capes, 25 Washington Avenue, Albany, N. Y.

JUNE 5-6.—WAYNESBORO, PA.
Pennsylvania Commercial Secretaries Association. Semi-annual meeting. Secretary-Treasurer, Donald J. Howard, Chamber of Commerce, Altoona, Pa.

JUNE 7-9.—SHEBOYGAN, WIS.
Wisconsin Association of Commercial Secretaries. Annual meeting. Secretary-Treasurer, Lee I. Yorkson, Wausau, Wis.

JUNE 8-9.—YAKIMA, WASH.
Washington Association of Commercial Organization Secretaries. Annual convention. Secretary, F. W. Mathias, Hoquiam, Wash.

JUNE 8-10.—DENVER, COLO.
International Association of Policewomen. Annual conference. President, Mrs. Mina C. Van Winkle, 420 Evening Star Building, Washington, D. C.

JUNE 8-13.—DENVER, COLO.
National Probation Association. Annual conference. General Secretary, Charles L. Chute, 370 Seventh Avenue, New York, N. Y.

JUNE 10-12.—ALEXANDRIA, MINN.
League of Minnesota Municipalities. Annual convention. Executive Secretary, Morris B. Lambie, Municipal Reference Bureau, University of Minnesota, Minneapolis, Minn.

JUNE 10-17.—DENVER, COLO.
National Conference of Social Work. Annual meeting. Secretary, William H. Parker, 25 East 9th Street, Cincinnati, Ohio.

JUNE 12-13.—PLYMOUTH, MASS.
New England Association of Commercial Executives. Annual meeting. Secretary, Herbert F. Sherwood, Chamber of Commerce, Fall River, Mass.

JUNE 15-17.—BILOXI, MISS.
Southern Commercial Secretaries Association. Annual convention-school. Secretary, Burke Hopgood, Chamber of Commerce, Durham, N. C.

JUNE 15-19.—SAN FRANCISCO, CALIF.
National Electric Light Association. Annual meeting. Managing Director, M. H. Aylesworth, 29 West 39th Street, New York, N. Y.

JUNE 15-20.—MINNEAPOLIS, MINN.
National Tuberculosis Association. Annual meeting. Publicity Director, Philip R. Jacobs, 370 Seventh Avenue, New York, N. Y.

JUNE 17-20.—GRAND RAPIDS, MICH.
Smoke Prevention Association. Annual convention. Secretary, Frank A. Chambers, City Hall, Chicago, Ill.

JUNE 21-28.—BRUSSELS, BELGUM
International Chamber of Commerce. Third general meeting. Secretary, American Section, International Chamber of Commerce, Washington, D. C.

JUNE 22-26.—SARATOGA SPRINGS, N. Y.
American Institute of Electrical Engineers. Annual convention. Secretary, F. L. Hutchinson, 33 West 39th Street, New York, N. Y.

JUNE 22-26.—ATLANTIC CITY, N. J.
American Society for Testing Materials. Annual meeting. Secretary, C. L. Warwick, 1315 Spruce Street, Philadelphia, Pa.

JUNE 22-27.—LOS ANGELES, CALIF.
American Physical Education Association. Annual convention. Secretary, Dr. J. H. McCurdy, Box G, Highland Station, Springfield, Mass.

JUNE 22-27.—SWAMPSCOTT, MASS.
Special Libraries Association. Annual convention. Secretary, Estelle Liebmann, E. I. Du Pont de Nemours & Company, Wilmington, Del.

JUNE 22-28.—On board S. S. Richelieu, en route from Montreal to Charlottetown, P. E. I.
Union of Municipalities of the Province of Quebec. Annual convention. Secretary, R. Prieur, 326 Transportation Building, Montreal, Quebec.

JUNE 23-25.—PITTSFIELD, MASS.
New England Association of Fire Chiefs. Annual convention. Secretary, Chief John W. O'Hearn, Watertown, Mass.

JUNE 23-25.—SARATOGA SPRINGS, N. Y.
New York State Sanitary Officers Association. Annual convention. Secretary, Walter A. Leonard, M. D., Cambridge, N. Y.

JUNE 23-26.—DETROIT, MICH.
National Association of Real Estate Boards. Annual convention. Executive Secretary, Herbert Nelson, 310 South Michigan Avenue, Chicago, Ill.

JUNE 24-26.—ROCHESTER, N. Y.
American Association of Nurserymen. Annual convention. Executive Secretary, Charles Sizemore, Louisiana, Mo.

JUNE 24-26.—SASKATOON, SASK.
Union of Saskatchewan Municipalities. Annual convention. Secretary-Treasurer, W. E. Hodge, Moose Jaw, Sask.

JUNE 25-27.—TULSA, OKLA.
United States Junior Chamber of Commerce. Annual convention. Secretary, A. C. Kellar, 603 Scripps Building, San Diego, Calif.

JUNE 28-JULY 3.—INDIANAPOLIS, IND.
National Education Association of the United States. Annual meeting. Secretary, J. W. Crabtree, 1201 Sixteenth Street, N. W., Washington, D. C.

JUNE 29-30—ATLANTIC CITY, N. J.
American Automobile Association. Annual convention. General Manager, Ernest N. Smith, Pennsylvania Avenue at 17th Street, Washington, D. C.

JULY 5-11.—PALO ALTO, CALIF.
Western School for Commercial Organization Executives. Address: Professor Edwin A. Cottrell, Stanford University, Palo Alto, Calif.

JULY 6-11.—SEATTLE, WASH.
American Library Association. Executive Secretary, Carl H. Milam, 86 East Randolph Street, Chicago, Ill.

JULY 20-AUGUST 1.—EVANSTON, ILL.
National School for Commercial and Trade Executives. Address: Robert B. Beach, Business Manager, Chicago Association of Commerce, 10 South La Salle Street, Chicago, Ill.

JULY 21-23.—ROCHESTER, N. Y.
National Association of Comptrollers and Accounting Officers. Annual meeting. Secretary, Mark M. Foote, 501 City Hall, Chicago, Ill.

AUGUST 1-6.—SAN FRANCISCO, CALIF.
American Home Economics Association. Annual meeting. Executive Secretary, Miss Lita Bane, 617 Mills Building, Washington, D. C.

AUGUST 17-20.—DETROIT, MICH.
International Association of Municipal Electricians. Annual meeting. Secretary, William R. Arbuckle, 99 West 41st Street, Bayonne, N. J.

AUGUST 24-27.—CHICAGO, ILL.
Association of American Cemetery Superintendents. Annual convention. Secretary, W. B. Jones, Highwood Cemetery, Pittsburgh, Pa.

SEPTEMBER 8-11.—On board S. S. Richelieu, en route from Montreal to Quebec
New England Water Works Association. Annual convention. Secretary, Frank J. Gifford, 715 Tremont Temple, Boston, Mass.

SEPTEMBER 21-24.—HAMILTON, ONT.
Dominion Association of Fire Chiefs. Annual convention. Secretary, Chief James Armstrong, Box 56, Kingston, Ont.

SEPTEMBER 28-OCTOBER 4.—PARIS, FRANCE
International Congress of Cities. Arranged by the Union Internationale des Villes et Communes and the Union des Villes et Communes de France. Secretary General-Director: M. Emile Vinck, Union Internationale des Villes et Communes, Rue de la Regence, 3bis, Bruxelles, Belgium. Paris headquarters: 29 Rue de Sevigne, Paris 3e. American headquarters: Office of THE AMERICAN CITY MAGAZINE, 443 Fourth Avenue, New York.

SEPTEMBER 29-OCTOBER 2.—LOUISVILLE, KY.
International Association of Fire Engineers. Annual convention. Secretary, James J. Mulcahey, City Hall, Yonkers, N. Y.

OCTOBER 5-10.—ASHEVILLE, N. C.
Playground and Recreation Association of America. Annual Recreation Congress. Secretary, H. S. Braucher, 315 Fourth Avenue, New York, N. Y.

OCTOBER 26-28.—KANSAS CITY, MO.
National Association of Commercial Organization Secretaries. Annual meeting. Secretary-Treasurer, A. V. Snell, Chamber of Commerce, Jacksonville, Fla.

OCTOBER 26-29.—DES MOINES, IOWA
American Society for Municipal Improvements. Annual convention. Secretary, Charles Carroll Brown, P. O. Box 1134, Lakeland, Fla.

Fordson

General Utility Power Plant

For grading, hauling, stump pulling, operating pump, concrete mixer, stone crushers, etc., Fordson Power has demonstrated its exceptional economy in actual service.

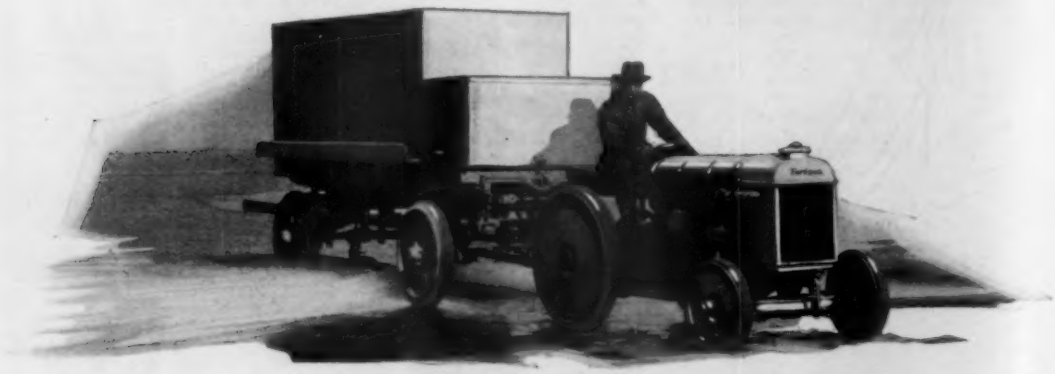
For street sprinkling, sweeping, and general maintenance work, Fordson Power costs so little that it soon pays for itself in the savings of operation.

A practical demonstration will show you how efficiently and economically a Fordson Tractor can operate. Your nearest Authorized Ford Dealer will provide this without obligation.

Fordson Tractor—$495 f.o.b. Detroit

Ford Motor Company

DETROIT



News and Illustrations

Items of Interest to City, Town and County Officials, and Others Concerned with the Economical Construction and Efficient Operation of Public Improvement Undertakings

A Cub Roller with Fordson Power

A new piece of equipment with a broad field of usefulness in hauling, scarifying and rolling, has been brought out by the Good Roads Machinery Co., Inc., Kennett Square, Pa., in its Monarch Cub roller made in 4- or 5-ton sizes with a Fordson tractor motor as the power unit.

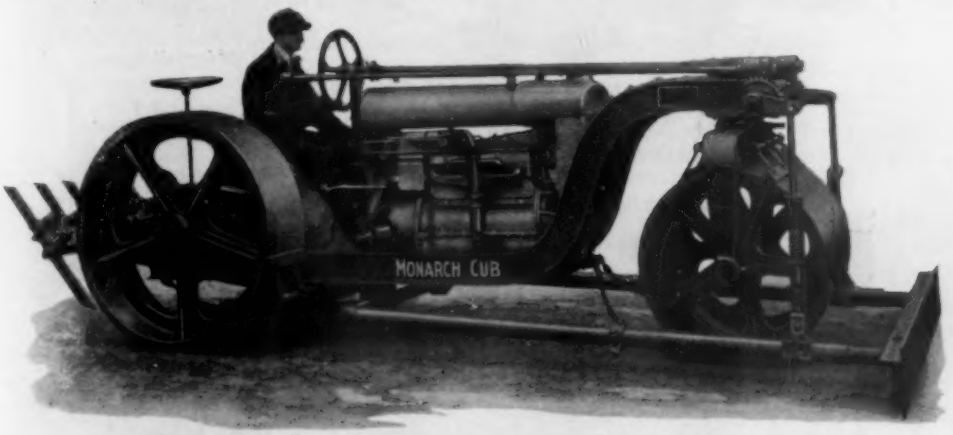
This unit, as illustrated, is equipped with leveler and scraper, made up of a 7-foot, 9-inch blade, extending across the front of the roller and held by two tubular braces attached to the frame. These braces are telescopic and, being drilled with holes properly spaced, permit the blade to be set at different scraping and spreading angles. Each end of the blade is attached to lift rods which are operated by a worm and gear mechanism attached to either side of the front of the roller, through two shafts and two crank-wheels, located at the rear of the roller, convenient to the operator. The two sets of mechanisms work as separate units, thus permitting either end of the blade to be raised or lowered independent of the other. The value of the leveler and scraper is found in the fact that it will act as a scraper in cutting off bumps in the roadway and as a leveler and scraper in moving and leveling earth, slag, gravel, cinders, crushed stone, and similar materials.

The scarifier of the Monarch Cub roller is furnished in two different models, one having three teeth and the other seven teeth. The three-toothed scarifier operates between the rear compression rolls of the roller and will break up a section of hard roadway 24 inches in width. The seven-toothed scarifier is designed along the same general lines as the three-tooth, except that the tooth holder beams are located back of the rear compression rolls and extend the full width of the roller. This wide scarifier has been designed to make it possible to scarify close to the forms in subgrade work and also to break up a highway close to the curb where necessary. For tearing up the subgrade, dirt and cinder roads and any light materials, the seven-tooth scarifier is recommended, and where it is desired to scarify hard material it is believed that better results will be obtained by using the three-toothed type.

The scarifier teeth are made of 1 x 2-inch high-carbon steel and, being pointed at both ends, are reversible and will afford double wear. They can be conveniently adjusted to various depths and are easily taken off for resharpening. The teeth are spaced about 9 inches apart and when in operation are set at an angle of about 40 degrees with the road line. By turning the teeth over in the clamps, the angle of the point will take a different angle with the road line. The raising and lowering of the scarifier teeth is accomplished by means of a worm and gear through a hand wheel convenient to the roller operator's seat.

New Grader for Truck Patrol Use

To meet the growing demand among highway officials and contractors for a stronger-built utility road grader that can be used with a motor truck in road work and then hauled a considerable distance to the next job without loss of time and without undue mechanical wear, the Stockland Road Machinery Company, Minneapolis, Minn., has produced the "Greyhound," a rubber-tired road grader. This machine was designed by R. V. Hilgedick and L. B. Sherman of the Stockland Company's staff. A number of basic changes from the Special Patrol design of this company have been made. The chief one is in the steering mechanism, which is a combination of the built-in type and the pole device. The hitch has been lowered approximately 4 inches to eliminate pull-down when the hitch on the power is low, and



CUB ROLLER EQUIPPED WITH SPREADER AND SCARIFIER

OKLAHOMA KNOWS HOW

BEST TRACKLAYER TRACTORS

KNOWS how to cut the cost of road building—knows how to make the most of the dependable power of Best Tractors.

These figures, from the Commissioners of different Counties are eloquent arguments for the Best.

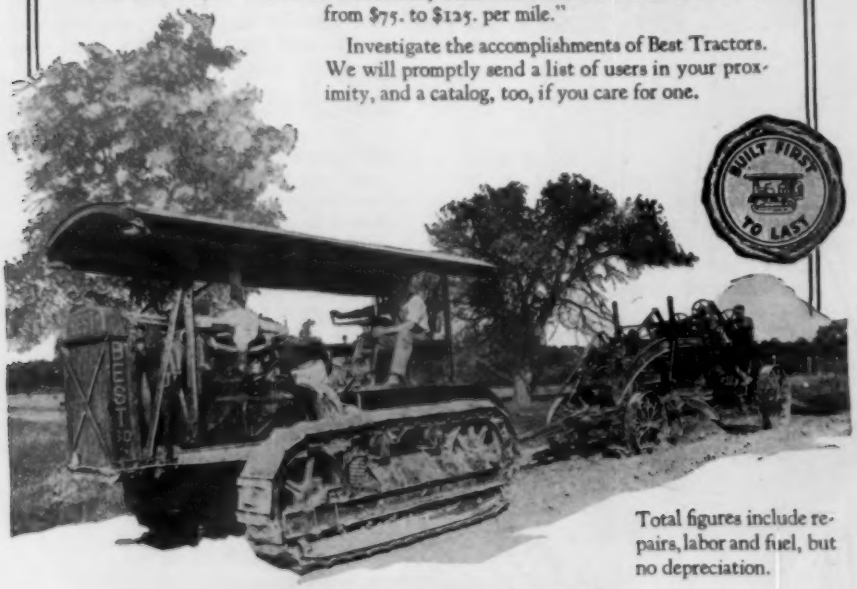
"Our total cost of building this ten miles of road *amounted to* $14.50 *per mile.*"

"In 89 days of successive work have graded 69 miles of road complete and have maintained some with finisher twice at a total cost of $1,022.40—*$14 50 a mile.*"

"226 miles of road graded in 282 days at a total cost of $19.79 *per mile.*"

"We figure that the cost of keeping our road in shape per mile with the use of this tractor is $14.00—whereas we formerly contracted this work done at a cost of from $75. to $125. per mile."

Investigate the accomplishments of Best Tractors. We will promptly send a list of users in your proximity, and a catalog, too, if you care for one.



Total figures include repairs, labor and fuel, but no depreciation.

C. L. BEST TRACTOR CO.

General Offices—Factory
San Leandro, California

Factory Branch—Warehouse
St. Louis • • Missouri

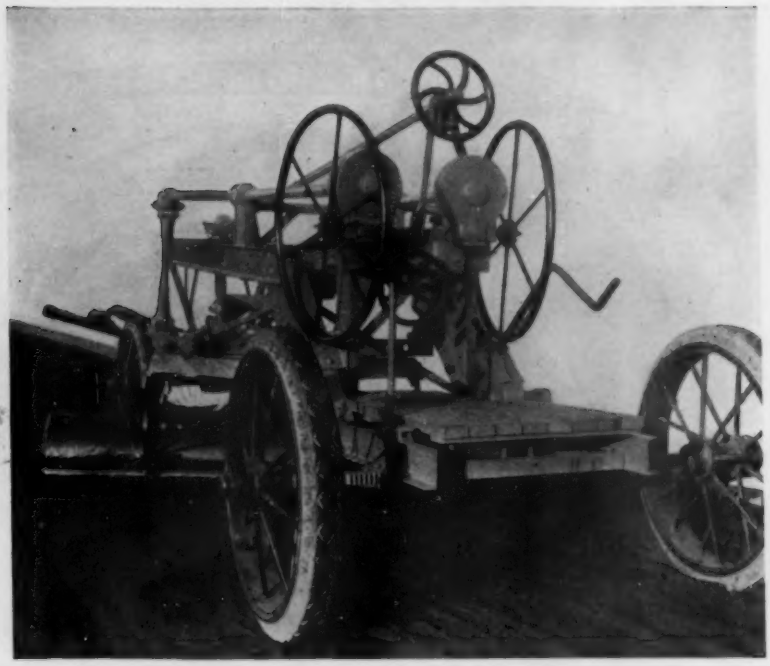
SALES OFFICES

San Francisco—127 Montgomery St.

New York City—30 Church Street

BEST TRACTORS

62-625 "DEALERS THROUGHOUT THE UNITED STATES"



THE NEW STOCKLAND RUBBER-TIRED GRADER UNIT

also to counteract any tendency of the front truck to tip backward. The front tread has been reduced 6 inches to give additional clearance on the pole of the blade and to remove possible strain on the steering device.

The entire front end of the grader is made heavier than standard construction to accommodate scarifier attachments and to hold them to the ground. The guide circles have increased length to give the circle additional support and greater bearing surface for wear. Another feature is the enclosing of all gears in dust-proof steel cases which permit running the gears in oil or grease. The Alemite system of forced lubrication is used throughout the machine.

Aside from the bearings in the land wheel, all bearings are either of bronze or babbittt and are protected with felt washers to help hold the grease and keep out the dust. Every permanent union is hot-riveted with oversize rivets, and all bolted joints are secured with close-fitting bolts drilled for cotter keys and fitted with castellated nuts to keep them from jarring loose from the vibration caused by the 18- to 20-mile per hour speed at which the grader may be hauled by truck from job to job.

The frame is 4½ inches higher than the regular Special, which permits the blade to cut a 1 to 1 inside ditch slope. The wheel-base has also been increased from 12 feet 5 inches, which is the wheel-base of the Special, to 13 feet 3 inches, which will help in filling depressions and knocking off high spots in the roadway. The steering column has been raised so that the operator can stand on a box or get higher up in order to get a better view of his work and still handle the steering of the machine conveniently.

The lifting arms of the Greyhound grader are increased from 1¾ inches to 2 inches and are machined at the three bearing points. A new centershift is furnished with tight joints, permitting free movement through any plane, and each joint is fully bushed and protected from dust and grit. The circle is also supported in the rear on swivel joints, and bushings and washers are furnished of the same type. The hand wheels on this machine have been narrowed down to a 29-inch spread, and a worm and gear axle shaft is furnished for the pivotal shift, which gives a shift at this point of 15 inches and is very fast and efficient. The gears on this shift are enclosed in a dust-proof case and are fully bushed.

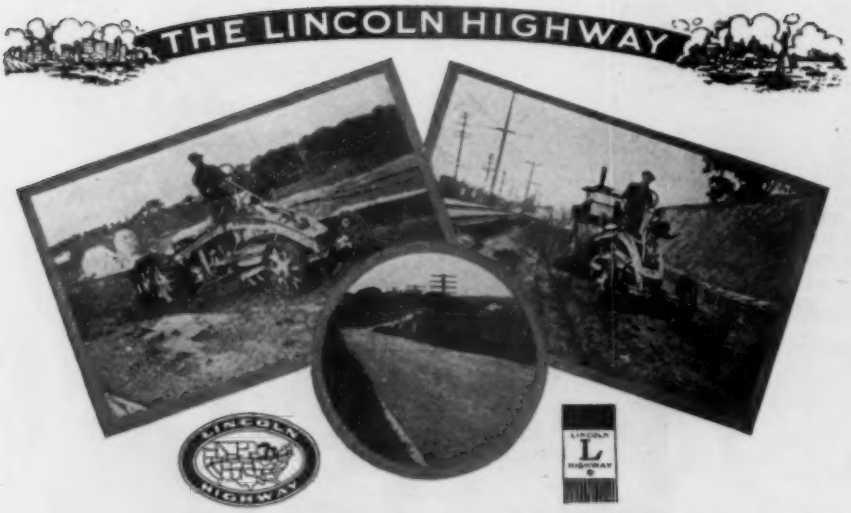
The wheels are equipped with 40- x 5-inch solid tires at the rear of the machine and 32- x 4-inch solid tires on the front of the machine. The bearings on the wheels are Hyatt heavy-duty bearings, and the operator's platform is suspended on coil springs to take any vibration of the machine off the operator's platform. In Oregon one of these machines has been equipped with a cab to protect the operator in cold weather and during rainy seasons. The machine is being used in Oregon, Minnesota, and other sections where the combining of patrol districts and long distances between jobs makes its use particularly valuable.

New Street-Lighting Equipment

Two new Multilux street hoods designed for use with Holophane two-way and four-way refractors as well as the Westinghouse-Holophane Bi-lux refractor or Luxsolite globes, have been brought out by the Westinghouse Electric & Manufacturing Company, George Cutter Works, South Bend, Ind.

These street hoods consist of an ornamental cast iron body made up of two parts, a cap and a skirt, all joints carefully sealed, making a complete unit, thoroughly dust-, bug-, and rain-proof. This type of street hood is adapted for use in smaller communities where ornamental units mounted on standards are too expensive. When used with ornamental crooks, they make an inexpensive and efficient lighting unit for such use.

The Multilux series street hood is suitable for operation on standard series circuits with 2,500- to 6,000-lumen series lamps. The Universal street hood is suitable for multiple service with 300- to



Let One Contractor Convince Another!

Walter Huber, Highway Contractor of Eaton, Ohio, bought and used a Hadfield-Penfield One-Man Grader.

Then he wrote to us:

> "I have built roads for a number of years and have used all kinds of equipment, but must say that the Hadfield-Penfield One-Man Grader is the best tool that I have ever used.
>
> "I have used it on the Lincoln Highway between Canton and Massillon, three and a half miles in length, and feel that the Grader has paid for itself. "I am safe in saying that it has saved the labor of fifteen men and one team every day.
>
> "I have done all of the fine grading and lots of the rough grading with the H-P. Easily keep ahead of the mixer. After forms are up we finish grade to quarter of an inch."

That is one man's opinion backed by facts. We can match it with a hundred like it, and so can you. Sell a man a Hadfield-Penfield and he will be your salesman without knowing it. The pictures show the Huber job.

This One-Man Grader, with a Fordson for power, reduces costs on ditching, rooting, scarifying, grading, road and street maintenance, and snow removal. Costs only one-fifth as much to operate as a horse-drawn grader, and the first cost is low.

For heavy work, sand and muck, H-P Rigid Rail Tracks, converting it into a crawler tractor, doubling the Fordson pulling power.

Write us for details

The Hadfield-Penfield Steel Co.

Bucyrus, Ohio

RIGID RAIL TRACKS — HADFIELD PENFIELD — ONE MAN GRADER

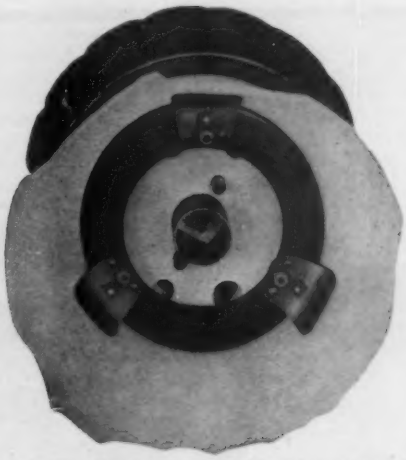
When writing to Advertisers please mention THE AMERICAN CITY—Thank you.

NEW WESTINGHOUSE PENDANT LIGHTING UNIT

500-watt lamps, for low-voltage series service with 300- to 500-watt lamps, for low-voltage series service with 15- or 20-ampere, 4,000 to 10,000-lumen series lamps, operated through pole type series transformers or safety coils, and for series service with 2,500- to 6,000-lumen series lamps on standard series circuits not exceeding 2,500 volts.

The Jiffy Globe Holder, designed to eliminate globe breakage and to economize in the maintenance of ornamental lighting systems, has been introduced by the Westinghouse Electric & Manufacturing Company. This device permits the removal of the globe almost instantly, provides quick relamping, and and has a number of other low-maintenance features. The mechanism of the device is simply constructed and easy to operate. By shifting a lever, the catch is released and the globe is easily lifted out. It may be replaced with equal facility, but can be reopened only by manual means, as the device locks automatically.

The globe rests on a resilient seat and is secured in position by resilient phosphor bronze grips. Screws do not come in contact with the glassware at any point. The globe holder is shock-absorbing and will prevent breakage of globes due to windstorms and jars or impacts, to which street-lighting standards are often subjected. An adjustment is provided for the variations in tolerance in globes of different sizes. Provision is also made automatically for expansion and contraction due to the elements and the heating of the light.



A DEVICE FOR HOLDING STREET-LIGHTING GLASSWARE SECURELY

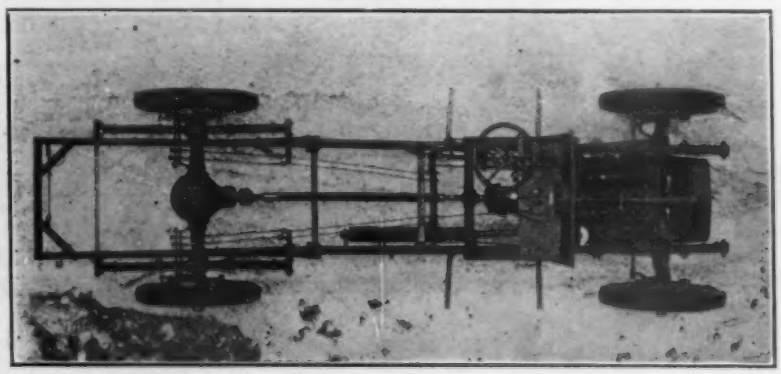
New Model One-Ton Trucks with Four-Wheel Brakes

Many recent developments of the automotive industry, including four-wheel brakes, are incorpoated in the new model one-ton truck which has recently been announced by the General Motors Truck Company, Pontiac, Mich. This truck represents radical improvements in motor truck design and is the first to be produced with four-wheel brakes, which is considered an added safety feature in commercial vehicles. The brakes are mechanically operated and have been tested under all road and load conditions.

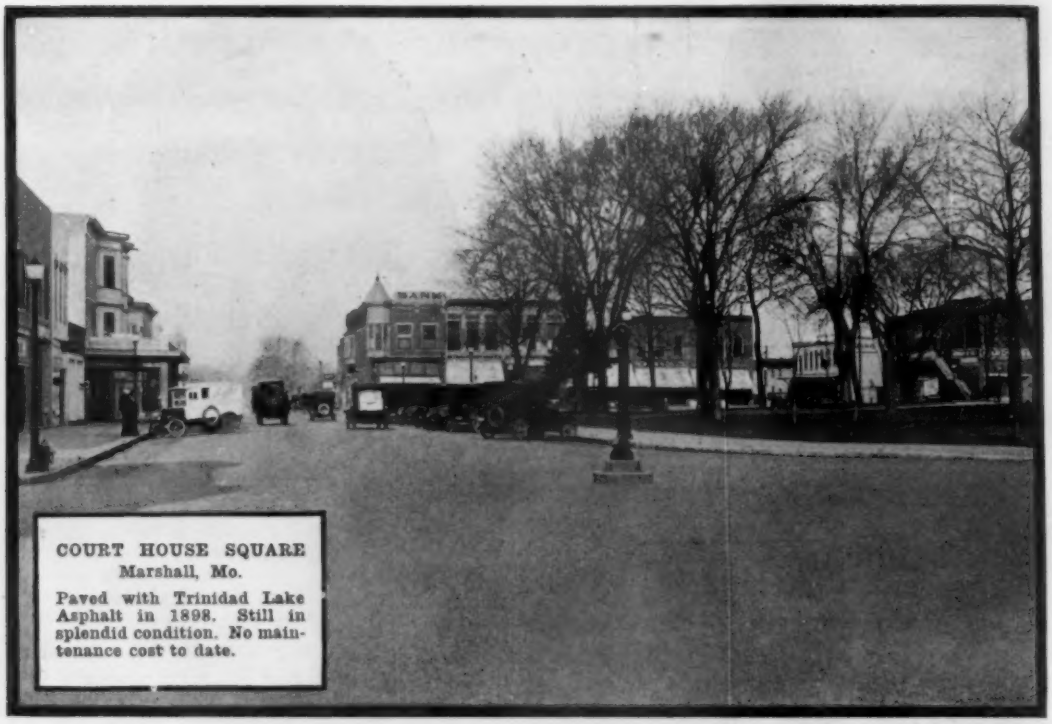
Greater attention than is usually the case is paid to the comfort of the truck operator. This has necessitated the rearrangement of the steering wheel and brake and clutch pedals into positions that will afford the driver ease of operation and position equal to that of a passenger car. In addition, controls, switches, and fuses are concentrated within easy reach and access of the driver.

Mechanical improvements have been added to the speed, horse-power, and rideability of the new truck, which has the standard GMC features, such as removable cylinders and full-pressure lubrication. In addition to the mechanical features, the outward appearance has been entirely re-designed. The radiator, hood, and chassis lines have been improved.

The engine has 239 cubic inches displacement, hav-



BIRD'S-EYE VIEW OF STRIPPED CHASSIS OF NEW GMC TRUCK WITH FOUR-WHEEL BRAKES



COURT HOUSE SQUARE
Marshall, Mo.

Paved with Trinidad Lake Asphalt in 1898. Still in splendid condition. No maintenance cost to date.

27 years old—

No maintenance to date

Far longer life. Much lower cost per year of service. Just two of the factors responsible for the world-wide use and popularity of Trinidad Lake Asphalt pavements.

Trinidad pavements have other big advantages. They are attractive, easy to clean, easy to repair and comparatively noiseless.

Trinidad Lake Asphalt is a nature-made bitumen—not an artificially-produced compound. It is less affected by service conditions than any other bituminous paving material. Let us send you some interesting data.

THE BARBER ASPHALT COMPANY

PHILADELPHIA

New York Chicago Pittsburgh St. Louis Kansas City San Francisco

TRINIDAD LAKE ASPHALT

ing a bore and stroke of 3 9/16 x 6 inches. It develops 37 actual horse-power, and the governed speed is 30 miles per hour. Three-point suspension is used, but with the innovation of inserting shock cushions between the engine and the suspension brackets. At the front end the cushion is in the form of a ring inside the bracket, entirely surrounding the starting crank-shaft bracket. At the rear the cushions are in the form of large cushion washers, enclosed in steel stampings. These shock cushions both reduce the vibration and eliminate noise.

The rear and front axles and the differential have been specially designed for the new model with a view to obtaining maximum strength and accessibility. Several changes have been made in the front axle, including inclined knuckle-pins to provide easier steering. Service brakes on both front and rear wheels are of the mechanical external contracting type. The emergency brake is internal-expanding, working on the rear wheels. An equalizer distributes the pressure between the front and rear wheels. Specially designed mechanism makes the four-wheel brakes easier to operate than most truck two-wheel brakes.

The wheel-base is 136 inches, and the standard chassis shipping weight is 3,433 pounds. The frame is of pressed steel, semi-flexible, 5½ inches deep, and 3/16-inch thick. It has four cross-members and diagonal braces at the rear. Newly designed springs materially increase the riding comfort of the truck.

Professional Training for Public Service

Announcements for the 1925-1926 courses in the School of Citizenship and Public Affairs are now available, in Bulletin 17b of Syracuse University. As previously mentioned in THE AMERICAN CITY, this new school was established in the fall of 1924 as an integral part of the College of Liberal Arts of Syracuse University. It was founded in the belief that inquiry into the significance and implications of citizenship is a major problem of democracy, that the College and University have peculiar opportunities for making the results of such inquiry available to its students through competent instruction and guidance in research, and, further, that the task assumed by these institutions is so important and many-sided that a definite unit might well be charged with special responsibility for this undertaking.

Of especial interest to readers of THE AMERICAN CITY are the courses offered by the School in conjunction with the staff of the National Institute of Public Administration, in preparing selected men and women for careers in civic administration and research, and for an intelligent official relation to modern public organizations, local, state and national.

In outlining this special activity of the School of Citizenship and Public Affairs, the Bulletin says:

"An important purpose will be to train young people for the profession of public service. Opportunities in this calling are increasing in number. The most important demand is well-prepared teachers both for secondary schools and the colleges. But with the increasing emphasis on sufficient government there is a growing demand for trained administrators. This is particularly true in the field of city management, although more recently preliminary training is coming to be looked upon as a valuable asset in other lines as well. This applies to public health and, to a certain degree, to public finance. Bureaus of research and many civic agencies also continually absorb a number of men and women who have had experience in research. Finally, in view of the changing attitude of the public toward politics as a career, more and more promising young men of broad training and outlook are entering political life in an active way and seeking office as representatives of their political party. The training of such prospective candidates for elective office will become more important as their number increases."

A New Line of Motor Trucks

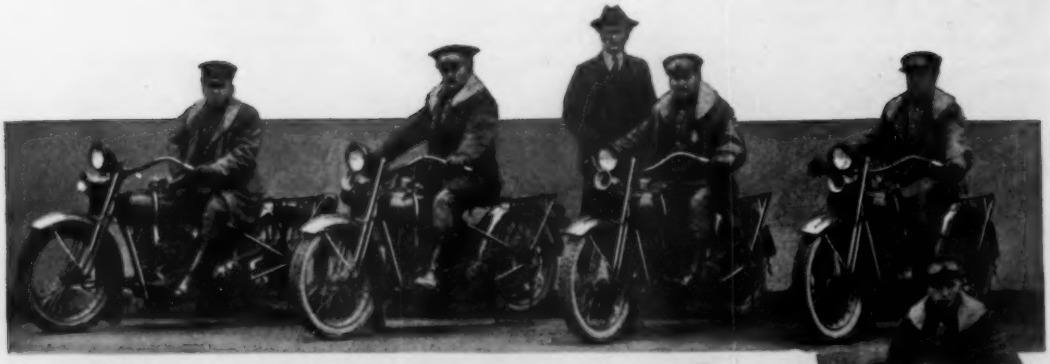
The Gramm & Kincaid Motors, Inc., Lima, Ohio, formed in January, 192-, by B. A. Gramm, formerly Vice-President of the Gramm-Bernstein Truck Corporation, and R. M. Kincaid, formerly Vice-President and General Manager of the Garford Motor Truck Company, has announced a line of 1-, 2-, 2½-, 3-, and 4-ton motor trucks built in two series. The first series consists of 1-, 2-, and 2½-ton and the Number 2 series consists of 3- and 4-ton trucks. These trucks have been so designed that a 1-ton chassis can be converted into a 2- or 2½-ton chassis by merely removing the 1-ton axle and spring assembly and replacing it with a 2- or 2½-ton unit, as desired. The same can be accomplished with the 3- and 4-ton series.

The design of the entire line has been worked out carefully, with the result that a great many units of all the models are common to the entire line, which serves to reduce the cost of maintenance and enables the fleet owner to reduce his investment in service parts. The factories are located at Lima, Ohio, and Bellefontaine, Ohio, with distributors throughout the country.

A TYPICAL GRAMM-KINCAID TRUCK

New District Engineer for Portland Cement Association

The Portland Cement Association, 111 West Washington Street, Chicago, Ill., has announced the appointment of F. M. Whitfield as District Engineer in charge of its work at Tennessee, with offices in the Baird-Ward Building, 150 Fourth Avenue, North, Nashville. The removal of the office from Memphis to Nashville, which is more centrally located, will enable the Association to improve its service. Mr. Whitfield has been connected with the Portland Cement Association as Field Engineer since December 1, 1923. Prior to joining the forces of the Association, he filled various positions with eastern and southeastern associations engaged in road and street promotion.



Ask Austin!

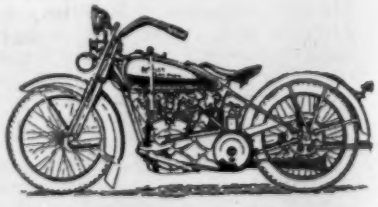
Performance—that's why Austin, Tex., has used Harley-Davidsons since 1918. "In view of their performance," writes Supt. of Police Nolan, "I have this year replaced all machines in the department with new Harley-Davidsons." Austin knows good police protection—and how to assure it!

More than 2000 other cities, towns, and counties have chosen the Harley-Davidson for its better performance and lower upkeep.

One city—Los Angeles—has just ordered 64 new 1925 police model Harley-Davidsons to re-equip its motorcycle force.

Do you know how quickly Harley-Davidsons *pay for themselves?* Write for special police literature.

HARLEY-DAVIDSON MOTOR CO.
Dept. M Milwaukee, Wis.



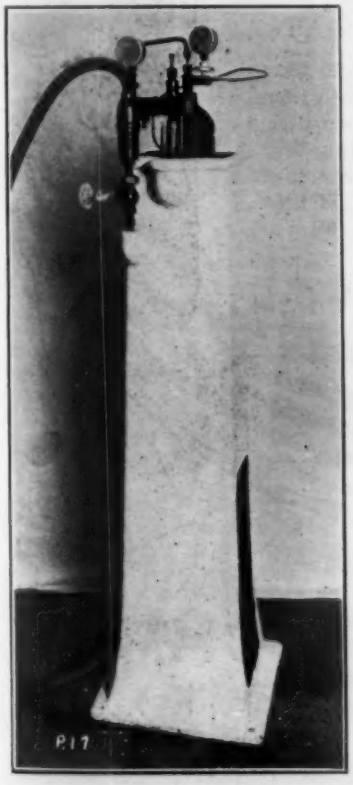
1925 police models have 27 improvements to provide more speed, more power and more comfort. And prices are LOWER. *Your local Harley-Davidson dealer will be glad to give a demonstration.*

Harley-Davidson
The Motorcycle

New Chlorinator for Small Water-Supplies

A small-capacity simplified chlorinator particularly designed for small water-works and sewage plants and for swimming pools, has recently been developed by the Paradon Engineering Company, 24 South Washington Place, Long Island City, N. Y., and is known as the thermostatically controlled Type-T unit. In installations of these types expert attendance is not obtainable, and hence a simple, sturdily constructed fool-proof chlorinator that can be operated by attendants of the caliber available and that is at the same time inexpensive enough to meet the rather limited funds usually appropriated for an installation of this kind, was necessary.

The chlorinator consists of a white vitrified enameled pedestal having a compartment which holds a small cylinder of chlorine, generally of about 12 ponnds capacity. A silver control valve is provided for regulating the flow of chlorine from this cylinder. A volumetric-type measuring meter indicates the amount of chlorine flowing. This meter is enclosed in a glass cylinder. An injector operated by an auxiliary water-supply draws the chlorine from the glass cylinder and carries it to the point of application, which may be either in a pipe line or in an open body of water. Part of the water flowing through the injector is by-passed and forms a water-jacket around the outside of the chlorine cylinder. This water-jacket keeps the chlorine cylinder at a constant temperature. Therefore, the flow of chlorine remains constant for any one setting of the silver control valve. A gage is provided to show the chlorine pressure, and another to show the water pressure. The injector is provided with a strainer. The suction created by the injector is utilized to raise the height of the water inside the glass cylinder, to facilitate measuring the discharges of the volumetric measuring meter.



PEDESTAL TYPE CHLORINATOR FOR SMALL SUPPLIES OR SWIMMING POOLS

The advantages which the manufacturers claim for this machine are that it is made out of material that will not corrode in the presence of moist chlorine; controlling the temperature of the chlorine cylinder by a water-jacket eliminates the necessity of a compensating reducing valve, greatly reducing the cost of the apparatus and adding to its simplicity. The chlorinator and chlorine cylinder are one unit, self-contained and compact.

This apparatus will handle capacities up to approximately 2 pounds of chlorine per 24 hours. Larger flows could be handled, but this would necessitate more frequent changing of chlorine cylinders, which ordinarily are of 12 pounds capacity. Water under pressure of at least 20 pounds per square inch is necessary to operate the apparatus. This type of chlorinator will take care of a swimming pool up to 100,000 gallons capacity. It will take care of the average small sewage disposal plant up to capacities of 50,000 gallons per 24 hours, and is suitable for water-supplies up to 100,000 gallons per 24 hours. The simplicity and low price at which this apparatus can be sold make it suitable for private water-supplies and sewage disposal systems, as well as for institutions, camps, and hotels.

The Paradon Engineering Company has announced the appointment of Leigh I. Holdredge, for several years District Sales Manager for Wallace & Tiernan in charge of their Philadelphia office, in charge of sales for the Paradon Company in the New England states and the states of New York and New Jersey.

P & H Move Pittsburgh Offices

The Harnischfeger Corporation, formerly Pawling & Harnischfeger Company, Milwaukee, Wis., has announced the removal of its Pittsburgh sales office from 57 Fidelity Building to 612 Farmers Bank Building, Fifth Avenue and Wood Street, Pittsburgh, Pa. A. J. Dreyer is District Manager, and M. B. Bradley is Sales Engineer at the Pittsburgh office.

A New Pitometer Service

The Pitometer Company, engineers, 50 Church Street, New York City, have been retained by the city of Providence, R. I., to make a study of the existing water distribution facilities and to prepare a 25-year program for the necessary water-main extensions and replacements.

Thompson Joins Illinois Paving Brick Association

The Illinois Paving Brick Manufacturers Association has announced the appointment of Lindsey E. Thompson as Field Engineer of the Illinois Association. Mr. Thompson has been successively with the Illinois Central Railroad in its Engineering Dept. of M. of W., Drainage Engineer of Webster County, Iowa, Superintendent of Sewer Construction, Salesman for the Watt Clay Products Co., and Sales Manager of the National Sewer Pipe Co.

The Newport Culvert

The Important Factor

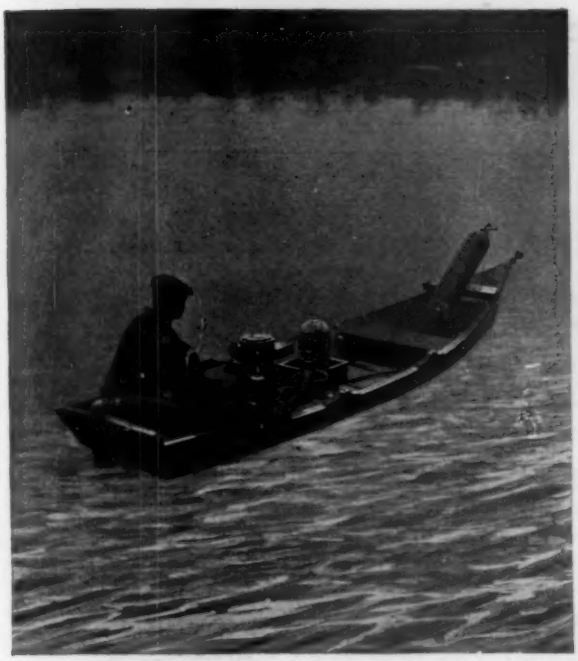
in the installation of culverts is their life. To insure long life to your culverts specify only Newport Culverts, which are made of GENUINE OPEN-HEARTH IRON, guaranteed to be 99.875% pure copper alloy.

Newport Culverts are made in both round and half-round types. The half-round type saves headroom and has the advantage of being made up in short sections, making it possible to readily remove any obstructions which may be found in them. Both sizes of culverts, which are corrugated, possess unusual strength and long life.

Send for our booklets containing complete data

NEWPORT CULVERT COMPANY

542 West Tenth Street Newport, Kentucky



A W & T CHLORO-BOAT IN OPERATION

Chlorinating Large Swimming Pools

With the development in the last few years of large public and private outdoor swimming pools in lakes, rivers, and parks, where the water is not recirculated by pumps, it has become necessary, in order to meet the problem of swimming pool sanitation, to develop equipment to sterilize the water through the application of chlorine.

The Chloro-Boat, developed by Wallace & Tiernan, Inc., Newark, N. J., which is illustrated herewith, consists of a modification of this company's vacuum type chlorinator mounted on a flat-bottomed rowboat supplied with water from a gasoline-engine-driven pump mounted in the boat. Fifty pounds of chlorine per day can be applied by the boat from one cylinder of chlorine. Because of the use of the vacuum type chlorinator, the quantity of chlorine can be regulated and distributed irrespective of the motion of the boat. Water is pumped through the chlorinator, and a chlorine solution is formed and discharged from the rear of the boat. The velocity of the solution will propel the boat slowly around the swimming area. The operator merely steers the boat. The chlorine introduced into the water will not only destroy bacterial life in the water, but, properly introduced, will remain present in sufficient degree to destroy such microbes of disease as are introduced into the water by the bathers.

This outfit makes the process of sterilization applicable for large swimming pools areas of either fresh or salt water. Properly used, the Chloro-Boat will protect the health of the bathers precisely as small chlorinators do in indoor pools. A larger boat of this type has been used for three years in the Tidal Basin of Potomac Park in Washington, D. C., which is used as a public bathing beach. This lake has an area of 110 acres and at high tide a depth of 9 feet and contains over 3,000,000 gallons of water. It is highly polluted with city sewage, but has been satisfactorily sterilized with chlorine, reducing the bacteria from 175,000 per cubic centimeter to less than 100 per cubic centimeter, despite the fact that several hundred thousand people frequent the beach during the season. There have been no water-borne infections traceable to bathing. The presence of chlorine in the water has not been detected by the bathers, and life-guards who have been in the chlorinated water practically continuously for two successive seasons have shown no irritation of the skin or mucous membranes.

Bolivia Awards Contract for Street Lighting

A contract for street lighting around the palace grounds of La Paz, Bolivia, for the inauguration of the new president and the centennial celebration of Bolivia's independence on August 6, has been awarded to the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., by the Bolivian Government through Ramon Pando, the Bolivian Consul General in the United States.

In the hundred years that have passed since the date on which the Constitutional Congress met at Chuquiesaca, Peru, to declare the independence of Bolivia, that country has prospered. Particularly in La Paz, the metropolis and governmental seat of Bolivia, is this prosperity seen. It is only fitting and proper, then, that they should be looking forward to this coming celebration, which will center in their city. According to the contract which the Westinghouse Company has with the Bolivian Government, the beautiful grounds of La Paz will be illuminated with 60 Broadway posts of five lights each, 10 Sol-Lux gate-post newels of five lights each, 12 Sol-Lux gate-post newels of one light each, 12 Sol-Lux bridge newels of one light each, and 12 Sol-Lux bridge newels of three lights each.

New District Offices for Industrial Works

Industrial Works, Bay City, Mich., manufacturers of locomotive cranes and crane equipment, have announced the opening of two new district offices, one at 425 Whitney Central Building, New Orleans, La., in charge of John A. Abele as District Sales Manager, and the other at 843-A Hurt Building, Atlanta, Ga., in charge of John J. Murphy as District Sales Manager.

Four additional district sales engineers have been appointed: Douglas J. Calder, Conway J. Neacy and Monroe J. Frankel, who will be located at the Chicago District office, 956 McCormick Building, Chicago, Ill., and Chester F. Delbridge, who will be located at the St. Louis District Office, Railway Exchange Building, St. Louis, Mo.

Asphalt Association Moves to New and Larger Quarters

The Asphalt Association has announced that it has moved its headquarters to 441 Lexington Avenue, corner of 44th Street and Lexington Avenue, New York City.

Permanent roads are a good investment —not an expense

This Is the Road That Gets the Traffic

No matter how many roads there are leading in or out of your town, the ones best paved get the traffic.

This is especially true if these roads are of Concrete. For every motorist appreciates the many advantages of driving over its true, rigid, unyielding surface.

No wonder Concrete Highways are crowded for mile after mile. More than 17,000,000 motor vehicles are using them today. And new cars are being produced at the rate of 4,000,000 a year.

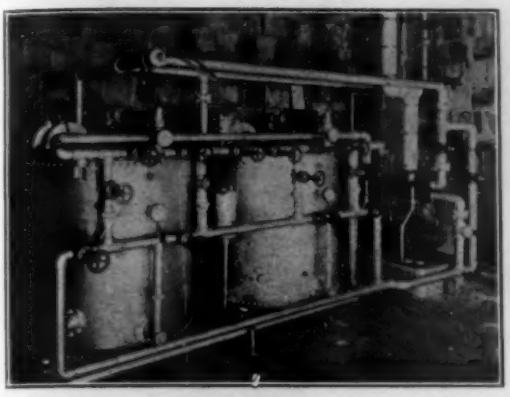
Here is a situation of vital concern to you. Everywhere we need more or wider Concrete Roads, or both, to take care of the ever-increasing traffic. And now is the time to plan for their construction.

Your highway officials want to be of the greatest possible service to you. Get behind them with ways and means that will provide more Concrete Roads and Streets. Such an investment will pay you big dividends year after year.

PORTLAND CEMENT ASSOCIATION

A National Organization to Improve and Extend the Uses of Concrete

Atlanta	Dallas	Kansas City	New York	Salt Lake City
Birmingham	Denver	Los Angeles	Oklahoma City	San Francisco
Boston	Des Moines	Milwaukee	Parkersburg	Seattle
Charlotte, N. C.	Detroit	Minneapolis	Philadelphia	St. Louis
Chicago	Indianapolis	Nashville	Pittsburgh	Vancouver, B. C.
Columbus	Jacksonville	New Orleans	Portland, Oreg.	Washington, D. C.



FILTER INSTALLATION AT MICHAEL REESE HOSPITAL NURSES' HOME IN CHICAGO

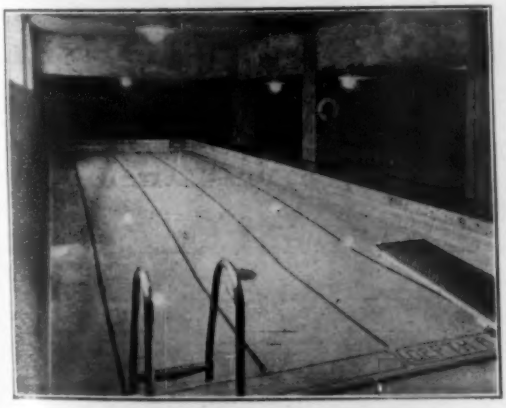
A Recirculating Filter for Swimming Pools

Swimming tanks have always been popular in Y. M. C. A.'s municipal recreation houses and clubs, and now they are becoming popular in nurses' homes connected with municipal hospitals.

When a complete recirculating system such as that manufactured by the Everson Filter Company, 647 North Green Street, Chicago, Ill., is installed, it is not necessary to empty the tank completely. The water may be permitted to remain several months or even a year. The bottom of the tank, as well as the walls, may be cleaned by a special suction pool cleaner which is part of the equipment. There is, however, some water splashed into the gutter during the use of the tank, and this must later be replaced by fresh water.

The object of a recirculating system is to eliminate the necessity for refilling and heating. It is estimated that under ordinary conditions it takes about one-half pound of coal to heat one gallon of water. Therefore, 60,000 gallons of water would take about 15 tons of coal to raise it to the proper temperature. In addition to the cost of the coal, there is the lost time while the pool is being emptied and filled and the labor cost for handling the coal.

It is generally accepted that a complete recirculating system used in connection with a swimming tank will pay for itself inside of two years; therefore, the investment pays a tremendous rate of interest. This system can be adapted to old tanks which are not so equipped at present, and every new tank should have a recirculating system built into it at the time it is constructed.



SWIMMING POOL AT NURSES' HOME

The accompanying illustration shows the complete recirculating equipment of the Michael Reese Hospital Nurses' Home, 29th & Ellis Avenue, Chicago, Ill. The outfit consists of two 54-inch pressure filters having a combined capacity of approximately 100 gallons per minute. The pumping unit takes the water from the deep end of the swimming pool, forces it through the filter system through the heater, after which it is sterilized with liquid chlorine and then returned to the pool at the shallow end. The swimming pool is approximately 20 feet from the filter installation. The pool holds about 60,000 gallons of water and is built to conform to the standard regulations for swimming pools. The tank at its deepest point at the end of the springboard is approximately 8 feet 6 inches deep. The black lines marking the lanes for swimming races show distinctly through the water. The filter plant is capable of changing all of the water in the tank every ten hours. In this way the water is kept crystal clear and pure. The Everson Filter Company supplied the recirculating equipment for this installation, and Schmidt, Garden & Martin, Chicago, Ill., were the architects. J. E. Dutcher and P. T. Potter were the engineers for the installation.

Holt and Best Combine

The Holt Manufacturing Company, of Peoria, Ill., and Stockland, Calif., and the C. L. Best Tractor Company, San Leandro, Calif., have been purchased by the Caterpillar Tractor Company, a new corporation organized under the laws of California. The officers of the new company are: C. L. Best, Chairman of the Board; R. C. Forth, President; Murray M. Baker, Vice-President; P. E. Holt, Vice-President; D. C. Heacock, Vice-President and Secretary, and O. L. Starr, General Factory Manager.

Caterpillar and Tracklayer tractors are well known as standard equipment in many industries, particularly in road building and maintenance, contracting, grading, and snow removal.

The new company will own the plant of the Holt Manufacturing Company at Peoria, Ill., consisting of 40 acres of land, of which 14 acres are under roof and which is capable of manufacturing 5,000 Caterpillar tractors per year; the C. L. Best Tractor Company, San Leandro, Calif., plant, occupying 10 acres, of which 5½ acres are under roof and which is capable of manufacturing 2,500 Tracklayer tractors per year; and the Holt Manufacturing Company's Stockland, Calif., plant, occupying 21 acres, of which 12 acres are under roof, and which is equipped for the manufacture of combined harvesting machines and of miscellaneous parts and some assemblies.

Changes in Sullivan Personnel

The Sullivan Machinery Company, 122 South Michigan Avenue, Chicago, Ill., has moved its Dallas, Texas, office from the Western Indemnity Building to 522-523 Santa Fé Building, where David H. Hunter is Manager. It has also announced that Earl E. Miller has been made Manager of its El Paso, Texas, branch office, succeeding R. S. Weiner, who is transferred to the general office in Chicago.

Clear the ROAD *with* CAL

CAL will put each block of the new street into service

Ten Days Sooner

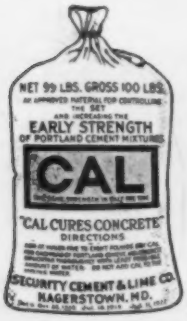
For Only **$27.72** *Per Day!*

This is the average cost of CAL for a City block. How many times that amount do merchants on the block lose every day their street is closed?

Cities and towns all over the country have used and are using CAL in streets and side-walks, because they know it pays to give merchants and shoppers the quickest possible service.

Tear down your detour signs and stop blocking traffic. Use CAL!

Cut Coupon Here.....



Security Cement & Lime Co., Hagerstown, Md.

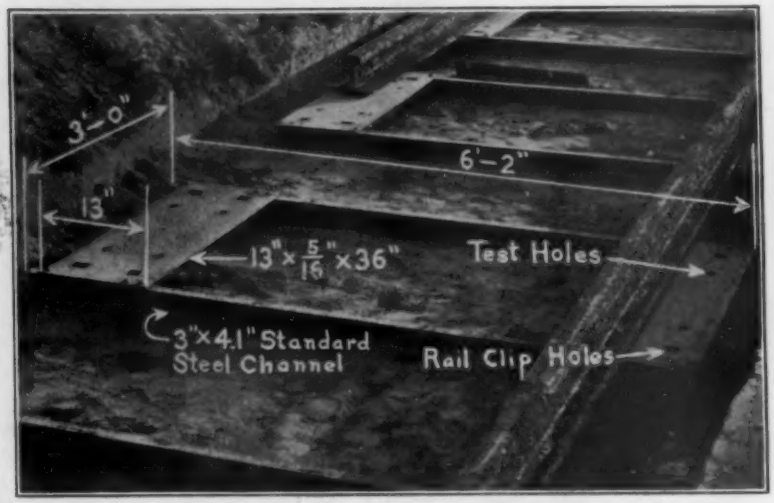
How much earlier can we turn traffic onto our streets by using Cal in the following class of work?

Concrete surface ☐
Concrete base: black top ☐
Concrete used: 1:1½:3 ☐ 1:2:4 ☐ 1:2½:5 ☐
Specified curing time.....days Thickness of concrete.....inches
Width of street.....feet Length of blocks.....feet

How much will Cal cost per block per day saved? Please send us the U. S. Bureau of Standards report on Cal.

NAME_____

TITLE_____ CITY_____



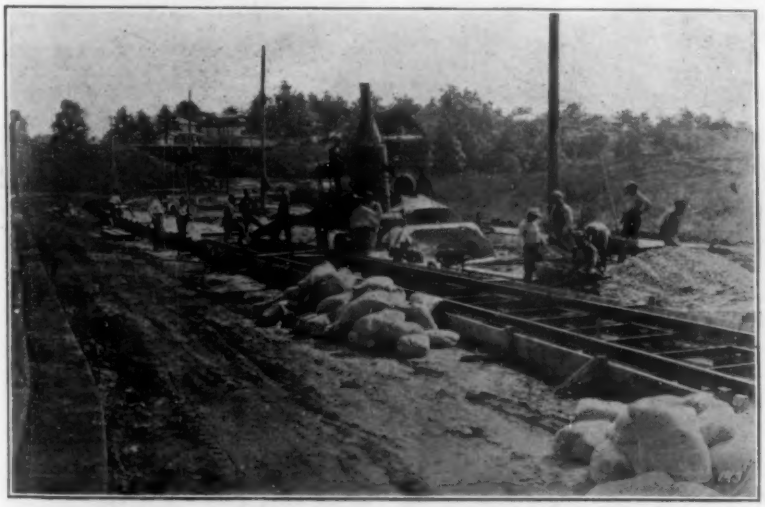
DETAILS OF STANDARD STEEL TWIN TIE

The Advantages of Steel Ties for Street-Railway Tracks

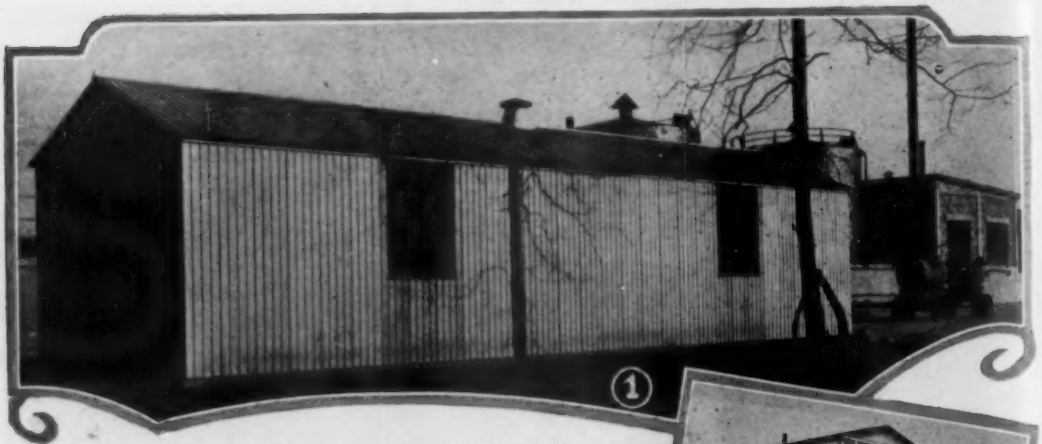
Distinctly new construction methods for renewable paved track in city streets have been developed by the International Steel Tie Company, Cleveland, Ohio, through the manufacture of its steel Twin Tie track.

The Twin Tie in its simplest form provides an effective bearing area when spaced at 6-foot intervals, equivalent to wood ties on 2-foot centers. With 7 inches of concrete below the base of the rail, these ties furnish the same effective bearing on the subgrade as wooden ties. A Twin Tie is a fabricated structural steel product made up of two 3-inch, 4-pound channels 6 feet, 2 inches long, for standard gage, spaced 2 feet, 9 inches back to back and riveted together with two 5/16 x 13 x 36-inch steel plates. These plates are centered with the rail base so that equal bearing is provided on both sides. Each plate is provided with four punched holes for the rail fastenings, as well as four 1¼-inch diameter holes clearing the rail base and so spaced as to show whether the tamping has placed the ballast material in complete contact under the plate. When these ties are to be used in rock ballast, the plates have their two longitudinal edges warped downward 2½ inches to form a tamping pocket beneath them and also to serve as an anchorage in the ballast.

The requirements of an economical design for a steel tie are met most successfully by separating the two basic requirements—(1) a bearing surface on the ballast, and (2) a cross-member to hold the rails to gage, as is done by the Twin Tie principle. In the standard Twin Tie, the bearing surfaces or plates take 63 per cent of the total tie weight, while the cross-members which hold the bearing surfaces to gage are 37 per cent of the total. This division, by making all the steel effective, results in the minimum weight per foot of track, which is the largest direct factor in the tie cost per foot of track. Nothing is sacrificed to



TRACK EXTENSION USING STEEL TIES, WINSTON-SALEM, N. C.



The Ideal Building for Field Work and Public Utility Requirements

Whether steel forms or road forms, transmission towers or turntables, batcherplants or buckets—Blaw-Knox has long been prominent in the development of highly specialized equipment for producing the dependable and economical result.

Thus, engineers and sponsors of public utilities, with confidence born of long experience with Blaw-Knox products, are turning naturally to the economies of Blaw-Knox steel buildings.

Designed on the unit-construction principle—easily erected, dismantled and enlarged—Blaw-Knox buildings are ideal where portability is required. Their remarkably low cost and low upkeep compared with wood; the fact that they are non-combustible and non-corroding; their enviable record for long life and sturdy resistance to rough usage, easily make Blaw-Knox time-tested buildings the choice over any other type of one-story construction.

Any type or size can be furnished to your exact specifications—for immediate delivery. Provide Blaw-Knox buildings for (1) road equipment, (2) contractor's buildings, (3 and 4) material storage, (5) voting booths, and (6) municipal housing requirements. See illustrations.

Write today for complete descriptive literature. Special prices or units in quantity.

BLAW-KNOX COMPANY, PITTSBURGH, PA.
629 FARMERS BANK BUILDING

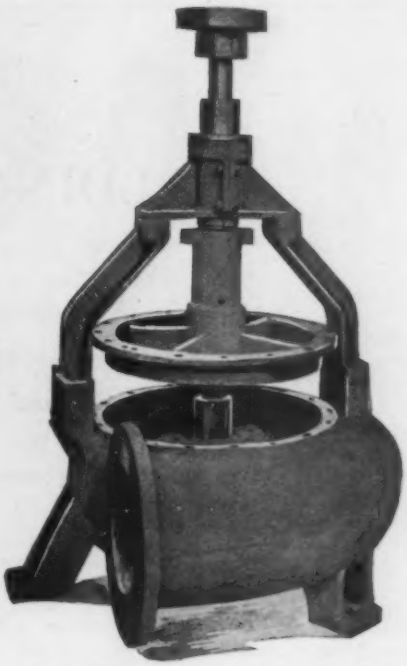
District Sales Offices: NEW YORK, CHICAGO, DETROIT, BALTIMORE, BUFFALO, BIRMINGHAM, CLEVELAND, 9500 Quincy Ave.
PHILADELPHIA, 231-33 N. 12th St.

BLAW-KNOX
All purpose, one story Buildings

Blaw-Knox Company,
Pittsburgh, Pa.
Without obligation, send me your literature. We have in mind a building ....ft. long .... ft. wide, to be used for .....
Name .....
Address .....
..... A. C.

the economic requirements in the design of these ties, for, as mentioned above, in the 6-foot spacing recommended a bearing area is provided equivalent to wooden ties on 2-foot centers. This bearing area is equal to 156 square inches per track foot, which exceeds the allowance on other steel tie track designs and is 10 times that necessary for a 25-ton car, figuring concrete in compression at 250 pounds per square inch.

An analysis of Twin Tie construction and wood tie construction shows that the former reduces the construction material 40 per cent, and still gives one inch more concrete in bearing. Furthermore, oak ties require a 9-foot trench, while the steel tie construction requires only a 7-foot trench. This also means a saving in labor costs which, with the use of only 880 Twin Ties per mile of track, as compared with 2,640 wooden ties, reduces the labor at least 50 per cent, according to the manufacturers. Twin Ties weigh 135 pounds and require two men to handle one tie, the same as a wooden tie. Being compact, the steel ties for more feet of track can be loaded on a car or stored in a given space than in the case of wooden ties. The reduction of the labor of laying track, and the saving in concrete and excavation, are economies that cannot well be overlooked in the extension or reconstruction of permanent tracks in paved streets. It will also be noted that less pavement area is disturbed when any reconstruction work is necessary, and this is an important item from the maintenance standpoint, both for the city and for the street railway company.



THE NEW YEOMANS NON-CLOGGING SEWAGE PUMP

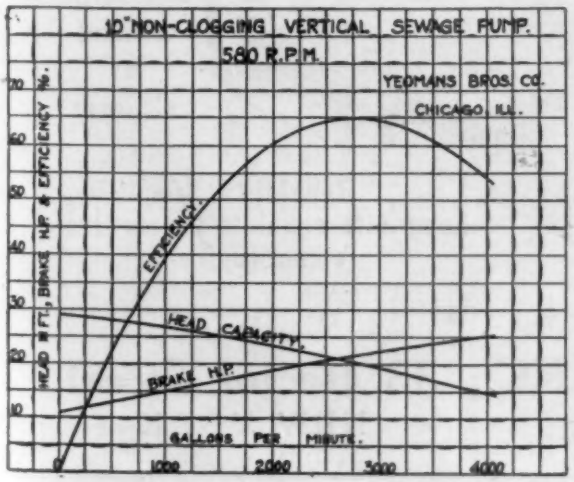
A New Sewage Pump

A vertical shaft centrifugal sewage pump of new design has recently been brought out by the Yeomans Brothers Company, 1417 Dayton Street, Chicago, Ill. This pump is of the two-port semi-inclosed impeller type and is designed for handling unscreened and raw sewage in municipal service. The accompanying illustration shows a 10-inch pump of this design arranged for mounting on concrete piers for bottom suction connection. This 10-inch pump will pass 7-inch diameter spheres.

The pump thrust bearing is mounted on a wide bearing yoke supported on the pump volute, which permits raising the top plate to give access to the interior of the casing without disturbing the bearings, shaft or propellor. The stuffing box is provided with a removable split gland so as to allow maximum clearance to the bearing. This yoke construction is a unique feature of the Yeomans pump.

The characteristic curves of this pump show a satisfactory efficiency for sewage pumps of this type. The pumps are equipped with a bronze-covered steel shaft, and the entire weight of the impeller, shaft, and shaft extension is carried on a self-aligned ball thrust bearing mounted on a motor base plate at the upper floor level, the pump thrust bearing serving only as a guide bearing and as a centering bearing for the impeller.

One of these 10-inch pumps and two 12-inch pumps have recently been built for the city of Santa Barbara, Calif.



EFFICIENCY CURVES OF VERTICAL SEWAGE PUMP

New Well for Lufkin, Texas

A deep well, producing 1,200,000 gallons of water daily, has just been completed by the Layne-Texas Company, an associate company of Layne & Bowler, Memphis, Tenn., for the city of Lufkin, Texas. The well is the largest in eastern Texas, and is 112 feet deep. The contractors drilled 15 test holes to determine the underground water conditions before locating the well. The guaranteed production of the well was exceeded by approximately 1,000,000 gallons daily.

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on your Playground Apparatus tells the World that you believe in *Safety First* for the boys and girls of your community.

Spalding Time-Tested Apparatus

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Sizes:
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Reliability, Simplicity, Long Life equal to the modern steam engine

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BOLINDERS CO., INC., 33 Rector Street

Stock — Parts — Service **NEW YORK**

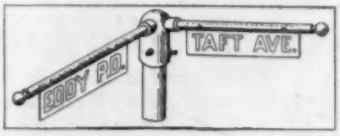
A ONE-WAY DOUBLE-NAME STREET SIGN BRACKET WITH DOUBLE-FACED SIGN WITH NAME OF INTERSECTING ROAD AT TOP

A ONE-WAY DOUBLE-NAME STREET SIGN BRACKET WITH DOUBLE-FACED SIGN WITH NAME OF INTERSECTING ROAD BELOW

A ONE-WAY SINGLE-NAME STREET SIGN BRACKET WITH DOUBLE-FACED SIGN

Porcelain Enameled Iron Street Signs

The Enamel Products Company, Eddy Road and Taft Avenue, Cleveland, Ohio, has developed its Tepco street signs and brackets in an interesting manner. The porcelain-enameled iron signs are made by fusing a vitreous enamel onto special 18-gage steel at a temperature of from 1600 to 1800 degrees Fahrenheit. This insures a durable hard-surfaced sign which is not destroyed by weather and the finish of which is more than simply a surface. The signs are made up in brilliant



POST HEAD MADE OF A 2 x 1 x 1-INCH SIDE OUTLET ELL WITH TAP HOLES AND SET SCREWS FOR AFFIXING ORDINARY STREET SIGN POSTS

colors, making them easy to read, and because of their smoothness they do not soil.

These signs in either the single or the double type are readily mounted on simple, comparatively inexpensive brackets and standards, as illustrated. The unit sign holders have a universal use in that they can be used not only on street sign standards but on existing iron or wood telegraph or lighting poles or building corners. The bracket is also adaptable for use with traffic signs of various types either on special standards or on existing posts.

A New All-Steel Spiral Slide

An all-steel spiral slide which gives a coast of 35 feet, but which occupies a ground space of only 5 feet by 18 feet, has been developed by the Hill-Standard Company, Anderson, Ind., and is known as its Fun-Ful No. 484 spiral slide. It has already shown popularity among children and has been welcomed particularly on playgrounds where ground space is scarce.

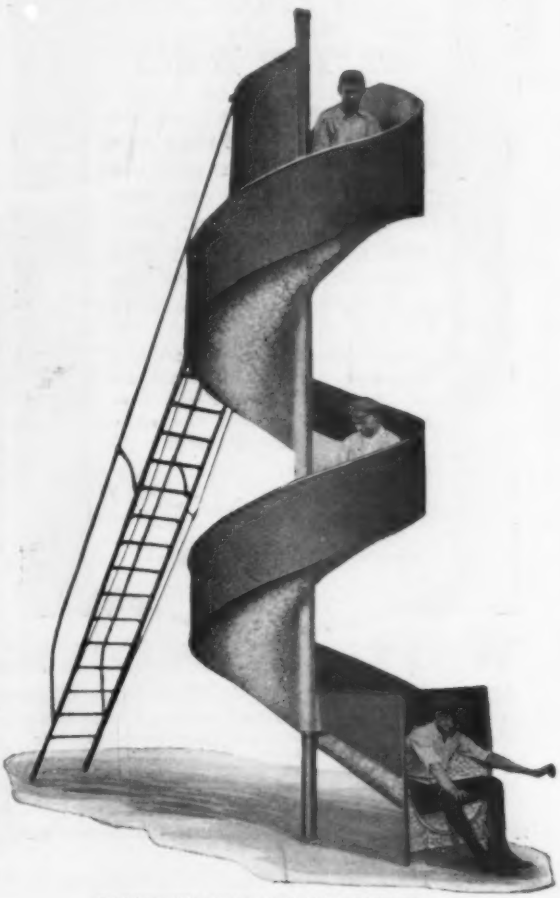
The slide stands 18 feet above the ground and is painted in bright colors. The chute measures over 35 feet in its spiral descent and is of a pitch that prevents a dangerous speed. The guard rim on the outside is unusually high, preventing even the smallest children from falling off the chute, regardless of the crowd. The bed of the chute is constructed of galvanized metal sheets overlapping similarly to shingles on a roof or the scales of a fish, giving a smooth coast and preventing any damage to clothing.

Badge Manufacturer Moves

C. G. Braxmar Company, Inc., manufacturers of municipal badges and fraternal jewelry, located at 10-12 Maiden Lane, New York City, for many years, have moved their office and factory to 242 West 55th Street, New York City.

Simons Enters Consulting Practice

George W. Simons, Jr., for nine years Chief Sanitary Engineer of the Florida State Board of Health, has resigned his position to become Chief Engineer of the Consolidated Development and Engineering Corporation, Inc., 15 Julia Street, Jacksonville, Fla. Mr. Simons will devote his attention to the practice of municipal engineering in the Southeast, specializing in water-supply, water purification, sewerage, sewage treatment, refuse disposal, and city planning.



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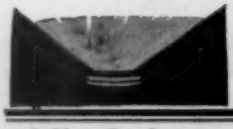

A New Book on one of the most important municipal problems of today

The alarming increase in street accidents and in street congestion during the past few years has rendered the correction of traffic condition one of the most important municipal problems of the present day.

JUST OUT

Street Traffic Control

By Miller McClintock

Consultant to the Los Angeles Traffic Commission
830 pages, 6 x 9, illustrated, $5.00 net postpaid.

This book analyzes the causes of existing street traffic difficulties, summarizes the experiences of the larger American cities and presents the conclusions of the foremost practical street traffic experts.

The chapter headings are:

1. The Origin and Growth of the Street Traffic Problem
2. The Traffic Survey
3. and 4. Causes of Congestion
5. Replanning the Street System for Traffic Relief
6. Changes to Increase Street Capacity
7. and 8. Regulation of Moving Traffic
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10. Regulation of Pedestrians and Drivers
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12. The Traffic Bureau
13. Police Equipment for Traffic Regulation
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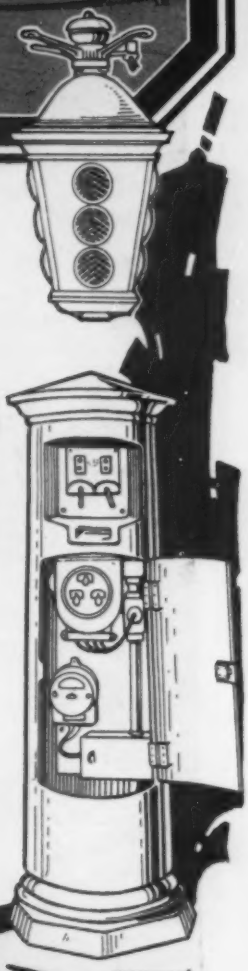

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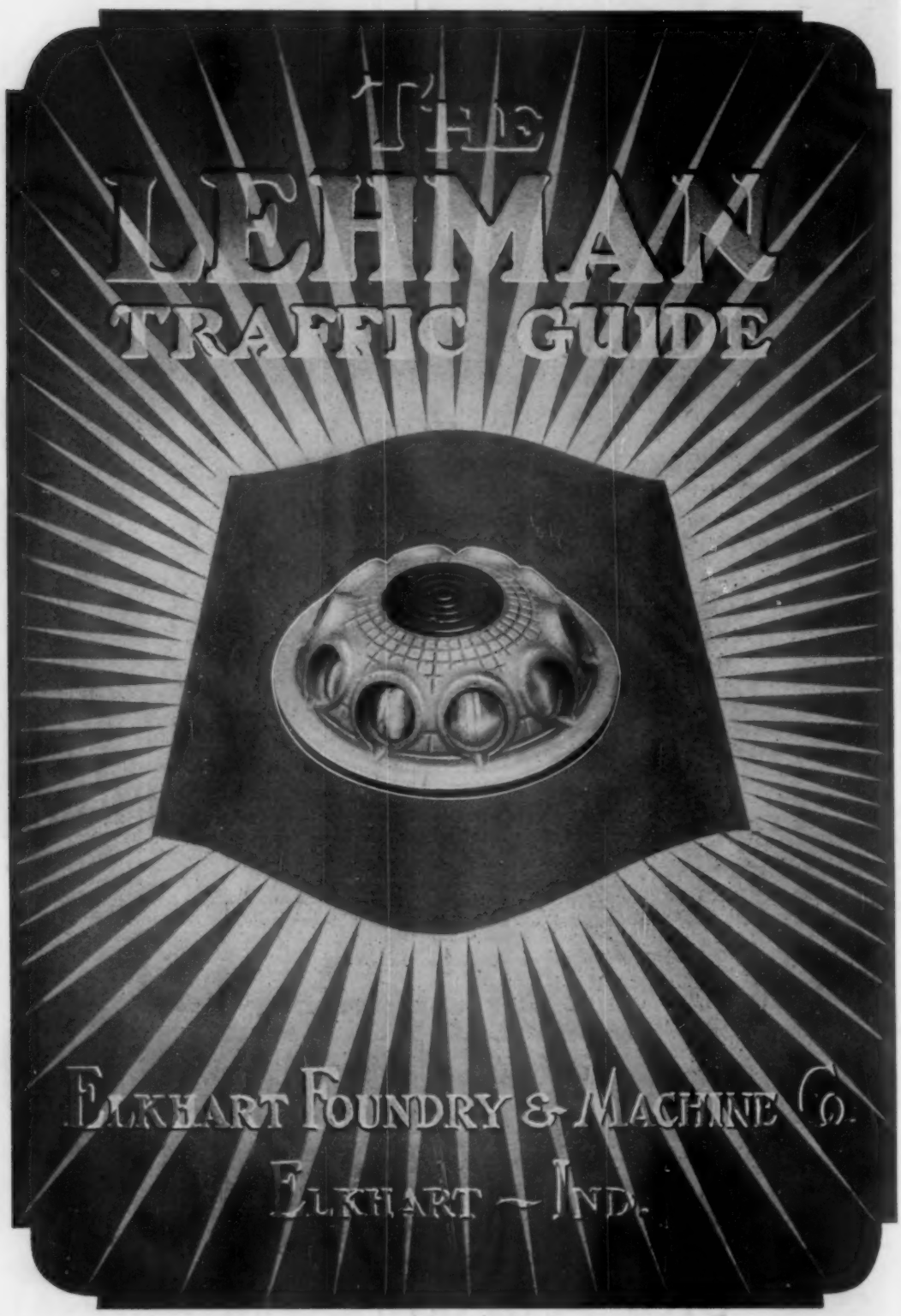
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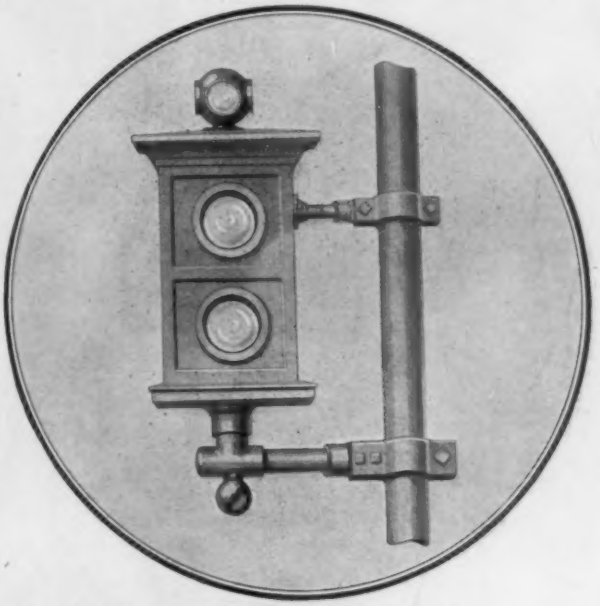
We specially recommend the worded type of **"Stop" and "Go" Signal** because the commands cannot be misunderstood.

The **Color Type Signal** is sometimes desired, so to meet this demand we also manufacture signals of this type, as shown in the illustration to the right.



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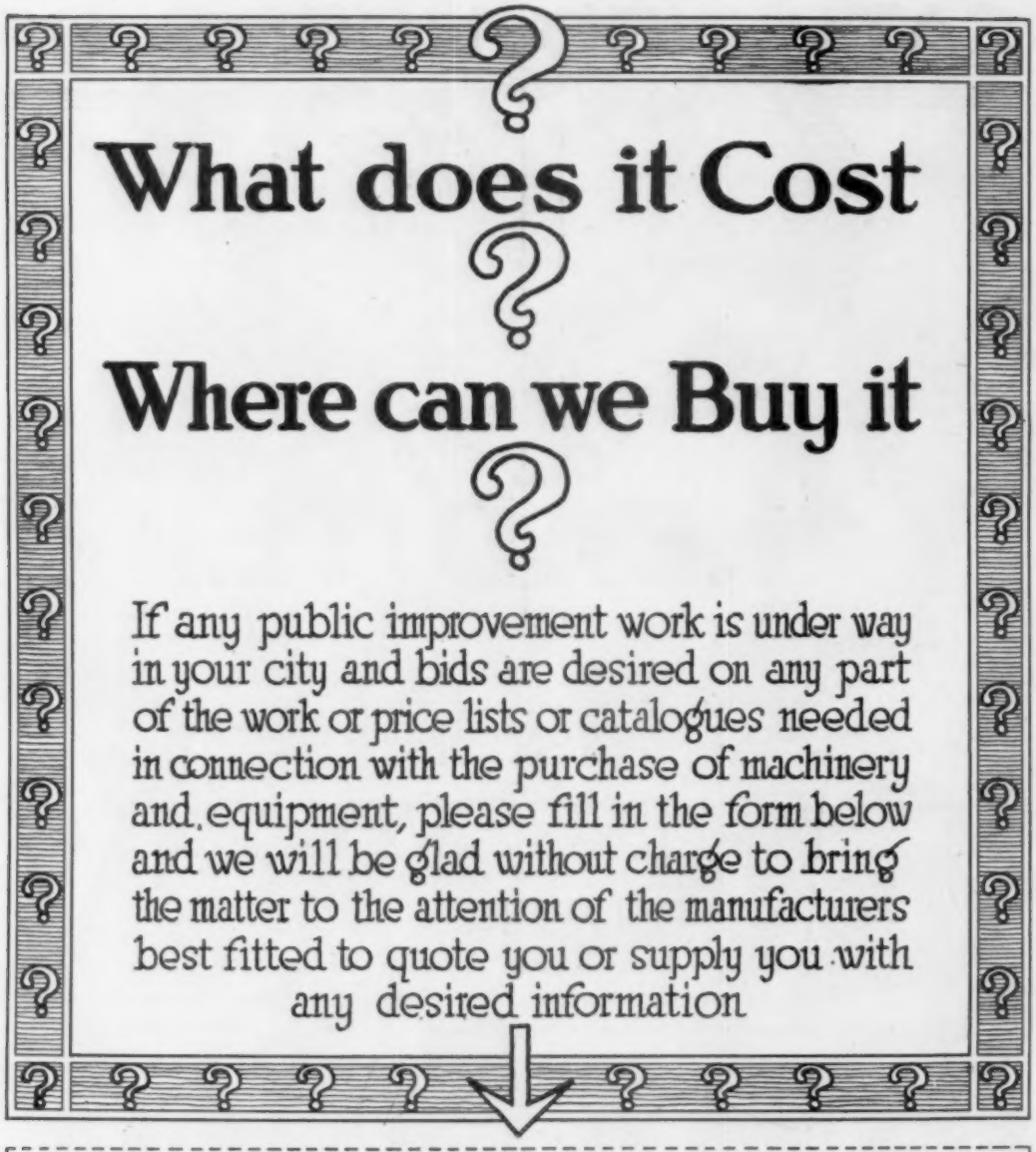
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If any public improvement work is under way in your city and bids are desired on any part of the work or price lists or catalogues needed in connection with the purchase of machinery and equipment, please fill in the form below and we will be glad without charge to bring the matter to the attention of the manufacturers best fitted to quote you or supply you with any desired information

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To assist department superintendents, municipal engineers, school officials and others who have occasion to buy or specify fences and gates, we have prepared a comprehensive Specification Manual which contains much valuable and helpful data, and, as well, full information regarding the lasting construction of Anchor Products. We will gladly send you a copy.

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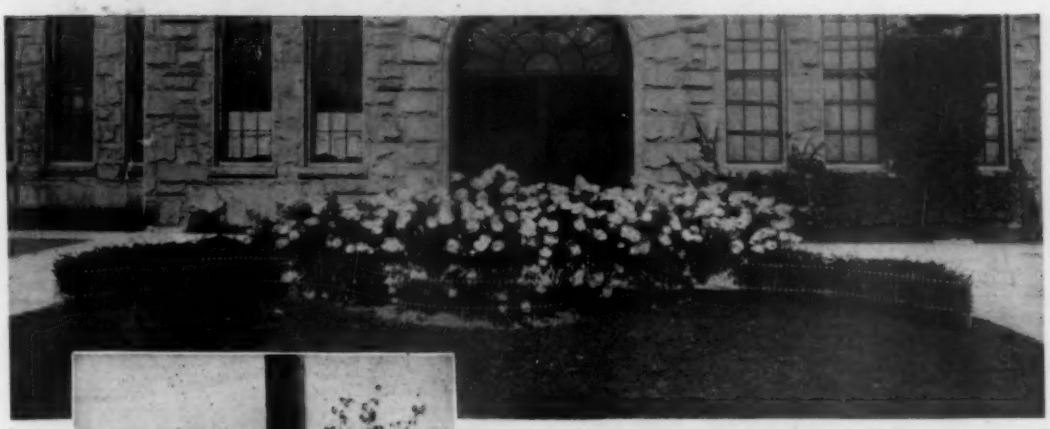

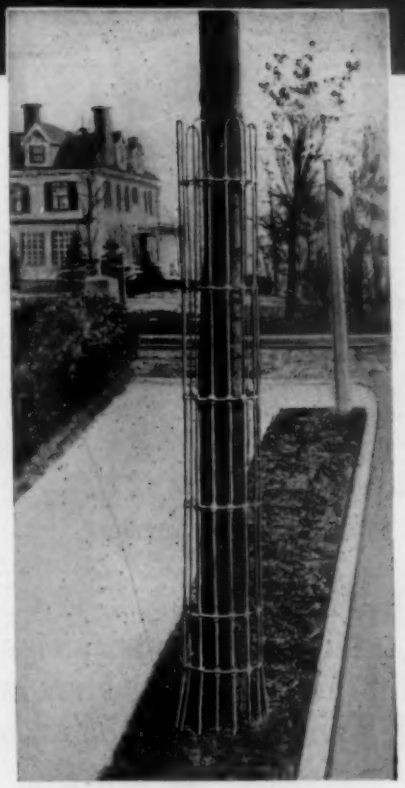

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Consider first, elimination of drinking contamination when you think of fountains. Remember this spreading of disease is impossible with R-S Vertico-Slant Fountains because *lips can't touch the R-S nozzle.* Pure, fresh, clean water comes in a slight slant stream which is just right for convenient drinking. Water that satisfies thirst sanitarily and safeguards public health!

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Safeguard Your Reservoir With a STEWART Iron Fence---

a fence that is BEAUTIFUL—
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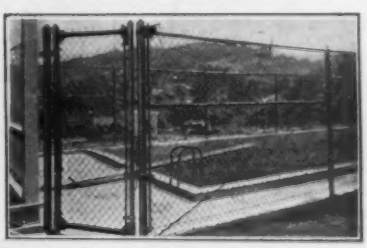

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One by one contractors have freed themselves of the labor and expense of old time curing methods by using *Dowflake* to replace ponding, earth and straw covering, moistening, inspection and all the other troubles of the old awkward ways.

State by state—after thorough testing, highway departments have accepted and endorsed the modern *Dowflake* method of curing and have approved the new way in their specifications.

Today one man at an engine will unload more cargo from a ship than a thousand laborers could move in the same time.

And, likewise, *Dowflake* will do more concrete curing in an hour than a flock of teams, scrapers, laborers and hose men with pipe lines and loads of earth can do full time for several days.

Likewise, when the curing is complete, *Dowflake* leaves a clean pavement while under old methods clearing away earth and straw and shaping shoulders was a bigger job than the curing with *Dowflake*.

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And the change has been made by a modern maintenance method, by means of which moisture is maintained in road surfaces.

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Road men next discovered that they need not wait for rain to shape up roads—they no longer waited for dry roads to be ground up and blown away.

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This moisture—the saver and keeper of roads, can be put into road surfaces by distributing *Dowflake*—a clean, white, flaky, odorless dust-layer which absorbs several times its weight in moisture from the air, holds the moisture for months, maintaining continuously the appearance of having received a light rain.

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Stands today first in the field and without an equal. For road maintenance it has many distinctive features—receding platform allowing operator full view of work—long wheel base—large wheels—blade lowered and raised by worm gear. It is easy riding and requires only one man and two horses. Weight 1200 pounds.

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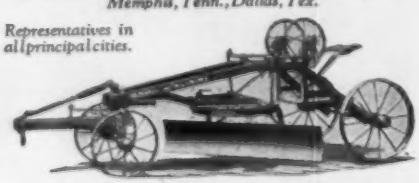
Affiliated Plants—Cicero, Ill., North Kansas City, Mo., Memphis, Tenn., Dallas, Tex.

Representatives in all principal cities.



THE HUBER MOTOR ROLLER

The Huber Four-Cylinder Motor Roller is a creation of Modern automotive engineering from which the last traces of jerky, noisy and uncertain gas engine design have been eliminated. It is almost vibrationless, starts easily and keeps going. Surplus power, convenient control, low center of gravity, and economy of operation. The compressed air scarifier folds up underneath the deck when not in use.

It starts, stops, backs up quickly without jerking or shifting of gears—a thoroughly modern equipment designed for the work it must do. Better than steam for rolling hot asphalt.

Write for literature and prices.

The Huber Manufacturing Company
102 Center Street Marion, Ohio, U. S. A.

Municipal Fire Departments

have long needed this Special Equipment

The Foamite *2½ gal. Splash-Proof Extinguisher. Throws out 20 gallons of Firefoam. Indispensable for smothering incipient fires of oil, gasoline, grease, etc. In copper or nickel plate.*

EVERY municipality has to cope with fires that water or liquid chemicals will not check: oil fires—gasoline fires—chemical fires—paint and grease fires

Fire Chiefs know such blazes must be ***smothered*** out—and experience has proved ***Firefoam*** from ***Foamite*** equipment the quickest acting, surest smothering agent ever perfected. A mass of clinging, heat-resisting bubbles that instantly kill fire under an air-tight "blanket"—equally effective on burning liquids or solid surfaces.

There are now three forms of ***Foamite*** equipment for fire department use.

The ***Foamite*** 2½ gal. Splashproof Hand Extinguisher throws out 20 gallons of Firefoam, enough to check the average incipient fire whether "extra hazardous" or ordinary It has a range of 35 feet.

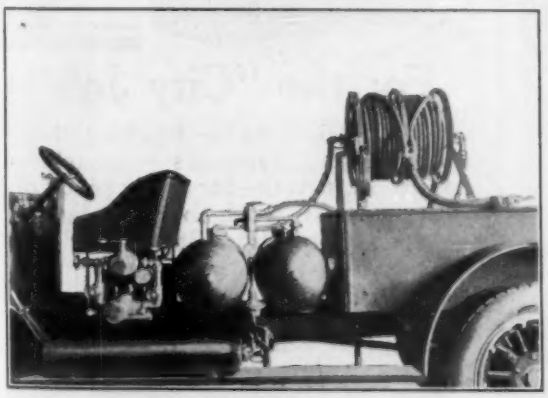
The ***Foamite*** Pumper, carrying from 500 to 1400 gallons of the ***Firefoam*** chemicals, is a large-capacity, long-range motorized unit for municipalities having unusually hazardous fire risks to safeguard against—chemical plants, paint manufacturing plants, oil storage stations and refineries, etc.

The new ***Foamite*** Chemical Tank Equipment is designed for installation in place of the familiar but less effective soda-acid tanks on trucks. Adaptable to any make of apparatus, either as a replacement or as original equipment specified with new apparatus. Furnished with either one or two 40 gal. solution tanks—the single tank unit generating about 300 gallons of Firefoam, the double tank unit about 600 gallons. A special pressure cylinder gives a range of 50 feet from the nozzle.

Chief Lohmann of Aurora, Ill., the first to equip with the new Foamite *Chemical Tanks*

The first fire chief in Illinois to adopt ***Foamite*** "FDT" Extinguishers—quick to see the value of ***Foamite*** Protection in fire department service—Chief Herman J. Lohmann of Aurora placed his order for the new ***Foamite*** "HD" Chemical Tank equipment as soon as this latest development was placed on the market in April.

Your Department should have the up-to-date advantage of this quicker, surer fire-fighting method. Write for further details and specifications of ***Foamite*** Fire Department Equipment. At your request a Foamite-Childs representative will call from one of our 400 service and sales offices.



The new Foamite *Chemical Tank Equipment. Furnished with either one or two 40-gal. tanks, special 200-ft.* Foamite *twin hose line and Siamese nozzle, and pressure cylinder giving a range of 50 feet. Can be installed on any make of apparatus.*

FOAMITE-CHILDS CORPORATION
Fire Protection Engineers and Manufacturers
86 Turner Street, Utica, N. Y.
Sales and Engineering Representatives in all leading cities

Foamite-Childs Protection

SERVICISED EXPANSION JOINTS

for State, County and City

The rapid adoption of Servicised Joints generally is its best recommendation. Servicised Joint, Type B, is a resilient quality structure of Asphalt and Fibre of the best quality.

All leading concrete states approve Servicised Joints. They can be secured at the following warehouses of our distributors, who are highly responsible, well rated concerns placing service to their customers first.

TYPE B

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SERVICISED Products Corp.
6051 W. 65th St.,
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GRAY TOP

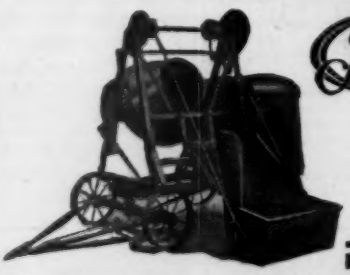
Indispensable

Modern progress calls for modern methods and modern methods call for modern equipment. In road building the progressive contractor considers Monarch Industrial Tractors Indispensable.

MONARCH TRACTORS, INC.
Watertown, Wis., U. S. A.

Builders of
The Crawler without Track Trouble.

Monarch
THE MOST DEPENDABLE CRAWLER TRACTORS



Jaeger
A MIX A MINUTE

The Standard Mixer of America

For the "City Job"

BUILDING roads—repairing them—laying sidewalks — patching worn-out streets—**for every piece of city concrete work there's a Jaeger mixer especially adapted to the job.**

The costs for road and street making and maintenance have been reduced to a minimum in the hundreds of cities using this famous "MIX A MINUTE" mixer. More speed, less labor, increased profits—that's the Jaeger story. Write for full facts on this standard line of mixers.

The Jaeger Machine Company
215 Dublin Ave., Columbus, Ohio

Dependable Power for Every Purpose

Power Headquarters

FOR twenty-four years—nearly a quarter of a century—Continental Motors Corporation has been considered headquarters for gasoline power. To this headquarters come manufacturers from every field to lay their power problems before this master motor-building organization. Here the experience, skill and ability of the world's largest builders of gasoline power units are at their disposal. As a result of this cooperation Red Seal Continental Motors are giving unfailing and economical performance in every industrial field.

Put Your Power Problems Up To "Power Headquarters"

CONTINENTAL MOTORS CORPORATION

Offices: Detroit, Mich., U. S. A.
Factories: Detroit and Muskegon

The Largest Exclusive Motor Manufacturer in the World

Continental Motors

From Dusty Road to

A Solution is found in TEX

To Lay the Dust

Each TEXACO Road Oil contains a certain percentage of pure, binding Asphaltic Cement. During 1925, the Pennsylvania State Highway Department will use more than 4,000,000 gallons of TEXACO to lay the dust on its highways.

Mat-forming Surface Treatments

TEXACO Surfacing Materials contain between 60 and 85 per cent. asphalt, and are applied hot. They require a covering of sand or small stone, with which they form a tough, waterproof mat. At low cost, an excellent surface for light traffic is obtained.

Light-traffic Highways

For this type of highway, TEXACO Asphalt Macadam or TEXACO Inverted Penetration Macadam are available. Stone of a specified size is bound into a smooth, resilient and dustless surface by pure asphaltic cement, applied before or after the stone.

TEX

New York
Philadelphia
Cleveland
Richmond
Boston
Kansas City

THE TEXAS
Asphalt Sales
17 Battery Place

Business Thoroughfare—
ACO Asphalt Products

Residential District

In this service, quiet and beauty are desirable as well as durability. TEXACO Asphalt Macadam, TEXACO Asphaltic Concrete or TEXACO Sheet Asphalt may be chosen. The last two are plant-mixed types. All three are resilient, attractive and durable.

Trunk Highways

Steady, heavy traffic is the burden of our trunk highways. In this service, *impact* is the chief destructive force. TEXACO Sheet Asphalt or TEXACO Asphaltic Concrete may be selected. These plant-mixed types readily *absorb* the heaviest impact, have a longer life and lower annual cost.

Main City Thoroughfares

In this service, a pavement meets the test of highly concentrated traffic. The last word in paving is demanded. Their perfect impact-absorbing, waterproof and temperature-proof qualities immediately suggest TEXACO Sheet Asphalt and TEXACO Asphaltic Concrete.

ACO

COMPANY, U.S.A.
Department
New York City

Jacksonville
New Orleans
Chicago
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TEXACO

Pennsylvania Golf is the closest cutting mower for putting greens, tennis courts and fine lawns.

Pennsylvania Trio is a time- and labor-saver on large areas, golf courses, polo grounds, parks or estates. It cuts an 86-in. swath.

Five Pennsylvania Quality Mowers driven by tractor will cut 60 to 80 acres a day.

When you get a PENNSYLVANIA Quality Lawn Mower for use on a golf course, public park or large estate, you have made a wise selection. Both from the viewpoint of efficient service and the standpoint of economy.

PENNSYLVANIA Quality Mowers, whether the tractor type (operated in gangs), the horse-drawn or the hand type, have made wonderful records for continuous service, in the past fifty years. They do not require repairs or sharpening and stand up under the hardest usage.

Selected materials, expert workmanship and rigid inspection at every step of manufacture are responsible for the long life of these celebrated mowers.

Let us send you the Pennsylvania Trio Book

Pennsylvania Lawn Mower Works
1615 North 23rd Street, Philadelphia

Mud-Sand-Bumps-Jars

—where other truck tires fail, Kelly Kats show their stamina

Up in your purchasing department, all truck tires look pretty good. But what happens when they get into action—in inches deep mud? On mushy, slushy roads? On jagged stone trails or bumpy, slippery hills?

The chief reason why Kelly Kats are so widely used is their dependable performance under conditions where other truck tires are helpless.

On roads where other truck tires slip and skid and are powerless to budge the load, your Kelly Kats get sure-footed, dependable traction—and usually get it without chains. This helps prevent one of the most frequent excuses for delays in deliveries.

On stretches where other truck tires pass along to chassis and engine the shocks and jars of the road, your Kelly Kats smother most of these bumps, because Kelly's distinctive side vent construction makes the Caterpillar fifty per cent more resilient. This saves you repair bills and lengthens the life of your truck.

There are no Caterpillar tires but Kelly Kats

KELLY-SPRINGFIELD
TIRE COMPANY

250 West 57th Street
New York

There are probably more users of Kelly Kats than of any other truck tire in the world. Ask any Kelly Kat user; then you'll become one yourself.

Cuts Sprinkling Costs in Half

THE cost of emptying the 500-gallon Heil tank in sprinkling is only 11c. With the horse-drawn wagon it cost 22c per load. Result—Sprinkling costs cut in half.

The tank above is used by the city of Newman, Calif. It is filled and emptied 40 times each day in a period of six hours, covering forty miles in that time.

Heil Sprinklers are in service all over the United States. Our Bulletin 146 gives you complete information on all Heil Municipal Equipment. Send for it today.

THE HEIL CO.

1242-60 26th Ave. Milwaukee, Wis.

One of Our Twenty-Five Distributors is Near You.

HONHORST
TAR HEATERS

"Built for service"

ALL STYLES
Portable and Stationary
25 to 200 gallons

See our page in Street Construction Section Municipal Index for the Kettle you need

or

Complete Catalog sent on request

THE
JOS. HONHORST CO.
1016 W. 6th St. Cincinnati, O.

AMERICAN STEEL & WIRE COMPANY

American Triangle Mesh and Electric Weld Reinforcing Fabrics

Wire fabric reinforcement for concrete roads ensures permanence

There is no form of road that is as economical, enduring and efficient as a concrete road. And when it is reinforced with steel wire fabric it is practically good for all time if the foundation and mixture is right.

Send for our new Road Building Book.

Chicago New York Boston Pittsburgh Cleveland Denver San Francisco

Build High Type Asphalt Roads Without Heating or Mixing

Pennsylvania State Road 201 between Philadelphia and Valley Forge.
Kyrock on macadam base.

Kyrock has solved the problem of laying high type asphalt surface on highways. Such projects, usually, are so far removed from heating and mixing plant that the laying of hot mix asphalt is both costly and hazardous.

Even the most isolated highways may be surfaced successfully with Kyrock. It is shipped ready to lay cold on any standard base. There is no mixing, heating or expert asphalt supervision. Ordinary road building equipment—shovels, rakes and roller—is all that is needed to lay Kyrock.

Kyrock pavements are smooth, noiseless, dustless and resilient. They do not shove or roll, nor do they become soft and rut in Summer.

Kyrock is the original and standard Kentucky Rock Asphalt. No bitumen or other materials are added to the natural product. Kyrock is carefully graded and laboratory tested at each stage of its production to insure uniformity.

Engineers and officials are invited to take up their new construction and resurfacing with our engineering department. Specifications for all standard Kyrock constructions and literature will be sent on request. Write for brochure A.C.

Kentucky Rock Asphalt Company

Incorporated

Marion E. Taylor Bldg. **Louisville, Ky.**

FOR STREET FLUSHING, STREET SPRINKLING, ROAD OILING, USE

South Bend

"Studebaker Model"

Manufactured by

MUNICIPAL SUPPLY COMPANY

SOUTH BEND, INDIANA

Atlas Portable Conveyors

Built in 15- to 60-foot lengths. Designed to handle all classes of loose and bulky materials. For a light duty unit investigate the Atlas Red Head.

Write for Catalogue C.

Atlas Engineering Company

Milwaukee, Wis.

THESE MACHINES ARE MONEY SAVERS.

Burch Spreaders are money savers, because they spread road material more evenly, economically and quicker. Contractors say they save their cost on the first mile of road work.

Burch Unloaders do equally well. The larger machine is unexcelled for emptying a car right into your trucks; the smaller portable machine will load anywhere at less expense than hand labor.

Look into this equipment. It is money saving, time saving and trouble saving. Write us.

The Burch Plow Works Co.

Dept. A.C. Crestline, O.

SPECIFY

KEYSTABOND

Stabilized Sheet Asphalt Pavement

KEYSTABLOCK

Asphalt Paving Blocks

The Keystabond Co.

294 Washington St., Boston, Mass.

GODWIN STEEL PAVING GUARDS

PROTECT THE EDGES OF STREET, ROAD, CURB & STREET RAILWAY PAVING. . . .

Write for Illustrated Catalog No. 23.

Various Sizes and Shapes adaptable to all types & character of paving.

W. S. GODWIN CO., Inc.

Race & McComas Sts., Baltimore, Md.

CHAUSSE

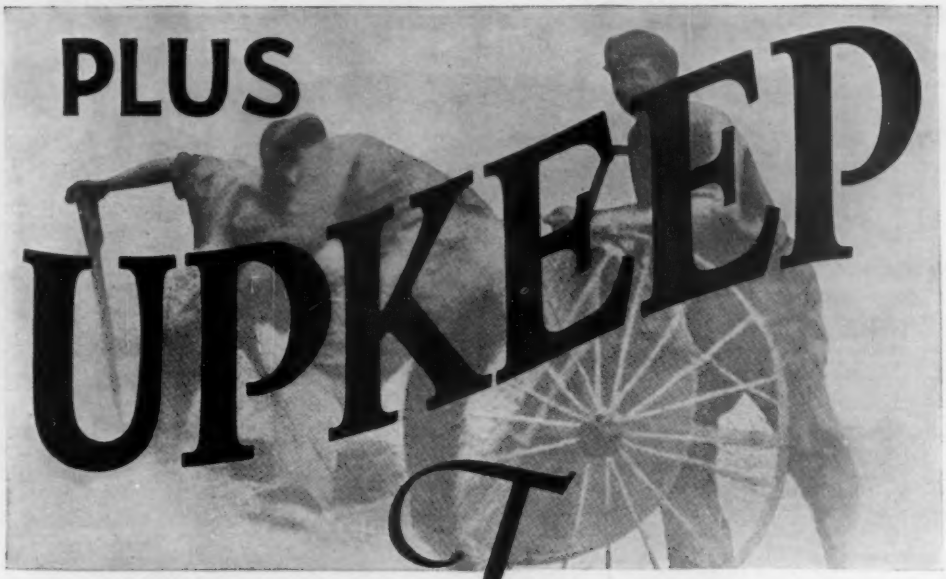
Oil Burning Tool and Surface Heaters

Kerosene Torches

Portable Asphalt Plant

CHAUSSE OIL BURNER CO.

1227 W. Beardsley Ave., Elkhart, Ind.



THE cost of any hard-surfaced road is the sum of the first cost and interest on the bonds, *PLUS the upkeep.* If you can dodge the need for continuous upkeep, road costs become insignificant.

There are plenty of roads in various parts of the United States which have given 20, 25, 30 and 35 years of service and have not required the attention of a road gang even an average of once a year. Continuous maintenance is unknown to them. These roads are *surfaced with vitrified brick.*

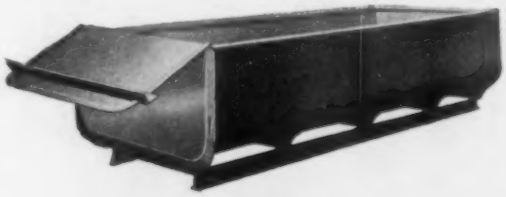
These brick roads are slightly higher in "first cost" than "cheaper" substitutes but they have since saved that difference ten or fifteen times over in freedom from repairs.

To prove the truth of these statements we would like to send you free some actual figures on paving costs and maintenance taken from public records. Write for a complete presentation of the economy of vitrified brick pavements—*the pavements that outlast the bonds.*

VITRIFIED Brick PAVEMENTS

OUTLAST THE BONDS

NATIONAL PAVING BRICK MANUFACTURERS ASSOCIATION, ENGINEERS BLDG., CLEVELAND, OHIO



Type W-30 Specifications

Inside tapered 12 inches narrower at front end to allow asphalt to slide freely when body is elevated. Outside shell of body No. 8 gauge steel, inside shell No. 14 gauge steel with 3/8 in. thickness of asbestos between. Bottom corners rounded. Manual control tail gate, single acting, tail gate latch and rod (not shown in cut) same as on other bodies with single acting tail gate.

WOOD DETROIT

Steel Dump Bodies

Hot Asphalt

Blistering hot asphalt poured on the job from the Wood Steel Dump Body Type W-30 will help you make better roads and streets more quickly and more economically.

This body is built to serve a particular purpose particularly well, and is the product of sixteen years of experience in constructing better dump bodies.

Whatever your body requirements may be there is a Wood Steel Dump Body designed especially to meet them. Write for our Hoist and Body Catalog.

WOOD HYDRAULIC HOIST & BODY CO.

World's Largest Makers of Hydraulic Hoists and Steel Dump Bodies

7936 Riopelle Street — Detroit, Mich.

BUFFALO-SPRINGFIELD ROLLERS

All Types and Sizes

With or without Scarifier attachment.

Helps you finish the job on time.

Send for catalog A for complete information.

The Buffalo Springfield Roller Co.
Springfield, Ohio.

Beautiful Dustless Roads In Town and Country

Lays the dust without inconvenience to pedestrians. No tracking, no staining. Ordinary laborers with hand shovels or the special Solvay spreader do the work quickly at little cost.

Solvay binds the surface and lays the dust. Its chemical properties kill weeds.

SOLVAY

Flake
CALCIUM CHLORIDE

"The Natural Dust Layer"

Solvay Flake Calcium Chloride is a clean, odorless, white, flakey chemical which lays the dust and is a perfect surface road binder. Solvay keeps roads in wonderful condition. It is the perfect material for town and country road treatment. Will not run hills nor form puddles in hollows. Economical in use and application—efficient in action.

Seventy-five conveniently situated distributing points assure prompt delivery and minimum transportation charges.

Write for Booklet No. 1002.

THE SOLVAY PROCESS COMPANY

Wing & Evans, Inc., *Sales Department*, 40 Rector Street, New York

Chicago Cincinnati Cleveland Boston Syracuse
Pittsburgh Detroit Indianapolis

You can *know* before you buy

You don't have to guess about pavements any longer—you can be *sure* if you buy

WARRENITE-BITULITHIC PAVEMENT

because it has done exactly the kind of work that *you* require, and has done it well. Abundant proof is yours for the asking.

Warren Brothers Company

A national organization to build good roads.

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796 FEET ABOVE BROADWAY

AN AHRENS-FOX RECORD

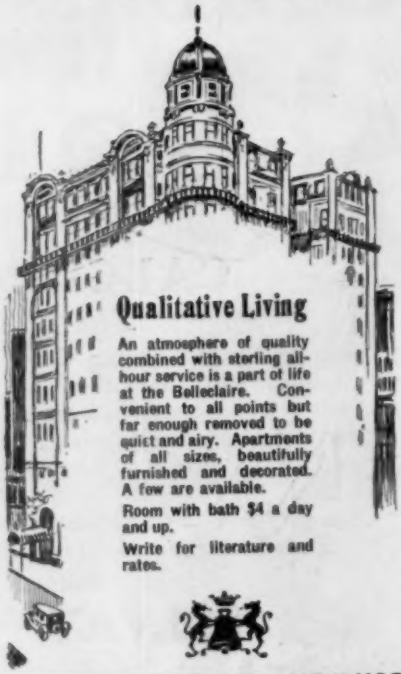
Inside the Fire Lines– Ahrens-Fox Piston Pumpers are known as the Hard Hitting Pinch Hitters.

ASK THOSE WHO KNOW

THE AHRENS-FOX FIRE ENGINE CO.

Cincinnati, Ohio

Hotel Belleclaire



Qualitative Living

An atmosphere of quality combined with sterling all-hour service is a part of life at the Belleclaire. Convenient to all points but far enough removed to be quiet and airy. Apartments of all sizes, beautifully furnished and decorated. A few are available.

Room with bath $4 a day and up.

Write for literature and rates.

BROADWAY AT 77TH ST., NEW YORK

New York City O.K.'s GMC's

During 1924 New York City bought 120 GMC Trucks. A remarkable record. It is apparent that the experienced transportation and equipment buyers of New York City have discovered that GMC's do better work, longer.

One reason this is true is because overstrength materials and parts have been developed for GMC Trucks and Equipment by GMC engineers and in the great Research Laboratories of General Motors.

And because GMC shares in the purchasing power of General Motors, these superior materials that enhance GMC value and performance do not increase cost. They cost no more than ordinary products purchased in smaller quantities.

If your community needs new equipment or trucks, ask for the GMC details before you decide. In the inventory of municipal assets, and out on the job, GMC's always look better.

GENERAL MOTORS TRUCK COMPANY
Division of General Motors Corporation
PONTIAC MICHIGAN

General Motors Trucks

CLIP AND MAIL

General Motors Truck Co.
Dept. 20 Pontiac, Mich.
Send me the details of GMC Municipal Equipment.

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Position .....
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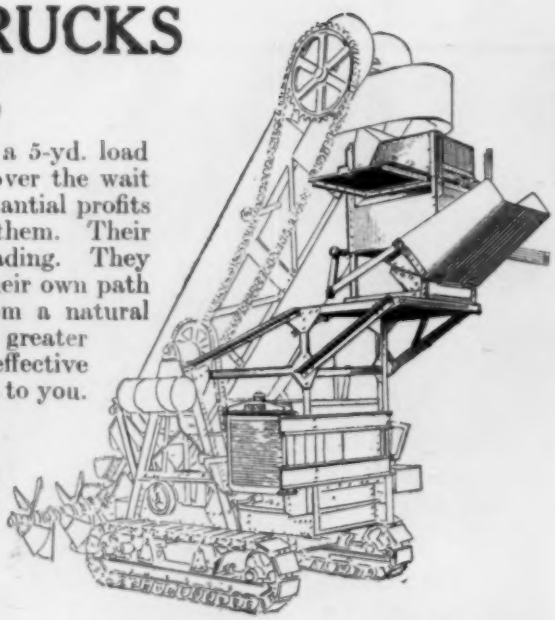
KEEP YOUR TRUCKS ON THE MOVE

Haiss Truck Loaders, that will put up a 5-yd. load in 2 minutes, save enough truck time over the wait for slower loading methods to put substantial profits in the pockets of the man who owns them. Their ability does not stop at stock-pile loading. They have true digging ability and will cut their own path through a pile, dig sand or gravel from a natural bank, or make a subgrade cut. Their greater strength, greater power and more effective digging ability make them worth more to you.



For the general utility machine, the Haiss Model 24 Creeper Loader is easily the first choice. But whatever your need you cannot afford to buy without looking over the Haiss line. Get our engineers' advice on your general material handling plan.

Ask for Catalog 523

Manufacturer of THE GEORGE -Truck and- Wagon Loaders Portable Belt Conveyors

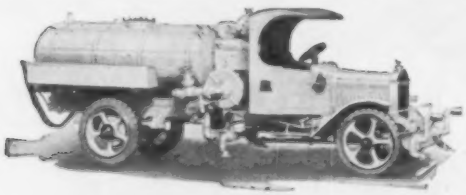
HAISS

143d St. and Rider Ave., New York, N. Y.

Established 1892 MFG. CO. INC Clam Shell -Buckets- Mail Handling Equipment

Roadbuilders!

The new Strike-off Measuring Hopper on a HAISS LOADER guarantees accurate batch measurement, to meet State specifications. This is only one more refinement on a machine you ought to be using.



A Flusher, Sprinkler and Fire Engine Combined

THIS Mack Unit is known as a Double Engine Combination Flusher and Sprinkler having a 1,000 gallon tank capacity mounted on a Mack AB Dual Reduction Drive Chassis and controlled entirely from the driver's seat. In addition to the regular flushing and sprinkling nozzles, this outfit has a special 2½" hose connection on the suction side of the pump which may be attached to a fire hydrant. With approximately 60 pounds water pressure at the hydrant a stream of a volume and pressure suitable for fighting the average fire can be delivered through a single line of hose having a standard fire department nozzle.

It has been proven that at spreading fires a number of small units can often be used more effectively than a few large pieces. Also in the event that one unit is out of service, the advantage of a suitable reserve is obvious.

Bulletins describing all types of Mack apparatus for municipal service should be in your files. Copies will gladly be sent on request. Write for them today.

MACK TRUCKS, Inc.

INTERNATIONAL MOTOR COMPANY

25 Broadway New York City

Mack

Eighty-five direct MACK factory branches operate under the titles of: "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION" and "MACK MOTOR TRUCK COMPANY."

A CLEAN SWEEP

TRADE MARK
Kinney
REG. U.S. PAT. OFF.

A CLEAN STREET

SPRINGFIELD
MOTOR PICK UP SWEEPER
A Clean City

Clean streets are a modern necessity, and are strong evidence of a progressive municipal administration.

No other mechanical system will so efficiently clean city pavements as properly constructed motor propelled pick-up sweepers.

THE KINNEY-SPRINGFIELD SWEEPER embodies latest improvements in this type of equipment. It will thoroughly remove all varieties of street rubbish including leaves, etc., with greatest efficiency and economy.

For satisfactory results use THE KINNEY-SPRINGFIELD SWEEPER.

Write for full details.

KINNEY MANUFACTURING COMPANY
BOSTON, MASS.

New York Chicago Philadelphia San Francisco Los Angeles Houston Kansas City

The

Interlocking Method

Is an improvement in the construction of a Bituminous Surface on a Concrete Base—

A practical, proven mechanical method of construction designed to obtain that most sought-after result, a dense Concrete Base interlocked with an immovable Bituminous Surface.

Compacted Concrete Bases laid under the Interlocking Method have the lowest absorption of any concrete so far produced. The uniformly spaced, symmetrical corrugations produce a mechanical bond which interlocks the Bituminous Surface where placed, eliminating creeping and waving under traffic. IT STAYS PUT!

The flexibility in units of the equipment used only on Interlocking Bituminous Pavements is such that its use is possible on any width of slab and upon any warped surface or irregular contour to be met on municipal construction. Sufficient equipment is always maintained on each project to meet any requirement exacted from it. Maximum yardage runs are common with the use of this special equipment and the progress of laying the Interlocking Bituminous Pavement is never curtailed due to the special equipment.

The Interlocking Method Assures—

1. Maximum beam strength of slab.
2. Greater resistance to expansion and contraction.
3. Highest resistance to traffic impact, surface irregularities and defects.
4. Perfect resistance to absorption.
5. Perfect surface interlocked with base.

Write for Booklet A-6

American Vibrolithic Corporation
Insurance Exchange Building
DES MOINES, IOWA

Sales Offices in 16 Other Cities

When in NEW YORK LIVE RIGHT at the RIGHT PRICE

THE next time you visit New York, stop at the popular Hotel Martinique. A modern, fire-proof building, in the very midst of the shopping, theatrical and business districts, the popular Hotel Martinique offers every convenience to the busy visitor.

From the Martinique, you can go direct to any place in the city without even stepping out of doors, via enclosed subway.

The rates at the Hotel Martinique are as low as $2.50 per day. Club breakfast 45c—delightful table d'hote dinner at $1.25. Special luncheons are also served at the most moderate prices possible.

Investigate the extraordinary service and economy of the Hotel Martinique, by stopping here on your next visit.

A. E. SINGLETON, Res. Mgr.

"The BEST without extravagance"

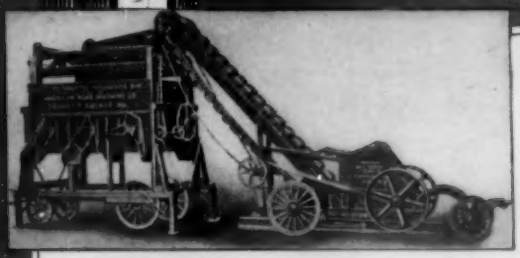
Hotel Martinique

Affiliated with Hotel McAlpin

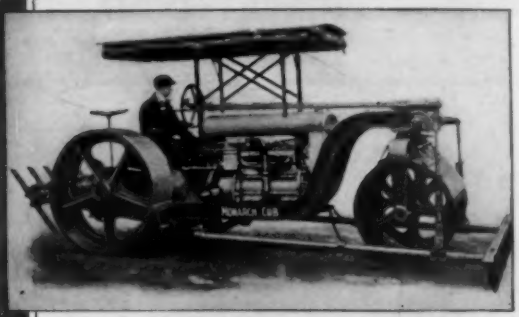
Broadway~32nd to 33rd Sts.
NEW YORK

NO MAGIC REQUIRED IN THE BUILDING OF ROADS

Use GOOD ROADS MACHINERY



The Champion Steel Rock Crusher, mounted, with Elevator, Screen and Bin, is the ideal rock crushing plant for towns, townships, counties, cities and contractors. Large in capacity—low in upkeep cost. Built in many different sizes.



The Monarch Cub Roller is a complete road building outfit in one unit. Low in first cost, and economical in operation, the Monarch Cub Roller with scarifier and planer attachment will prove to be an economical investment wherever roads are to be built or maintained.

The Champion Heating Distributor, for mounting on motor trucks, will apply any kind of bituminous materials, light, medium, or heavy. Material can be heated quickly and applied in any quantity desired. Made in 600, 800, and 1000 gallon sizes.

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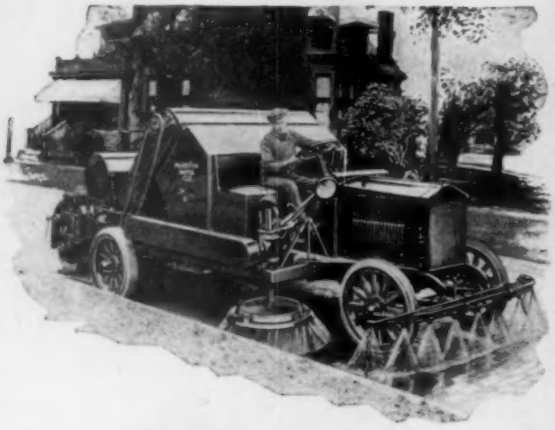
Spotless Towns are steadily increasing in number. The American public will no longer tolerate filth.



There are many reasons why Austin Sweepers wear longer, do better work and cost less in up-keep.

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Melvin, Ill., March 20, 1928.

Standard Oil Co. (Indiana),
Chicago, Illinois.

Gentlemen:

I am enclosing two views of streets in Melvin, showing the use of Standard Asphalt Road Oil #5, this being the only road oil we have used for a number of years. We tried some other kinds a few times, when we first started to oil, but they were not satisfactory.

We find the #5 Standard Asphalt Road Oil runs uniform and we have confidence in it. Our streets have received less than half the amount usually applied in the last two years and they stand up fine.

The last two years, on the township roads, we have applied about 2,700 gallons of oil to the mile, in two applications—one of about 1,500 gallons in July and one of about 1,200 gallons in October and our roads are in very good condition the year round.

Yours truly,

A. Buchholz

Commissioner Peach Orchard Township,
Pord County, Illinois.

The letter from Mr. Buckholz and pictures of streets in Melvin, Ill., give unmistakable evidence of the economy and excellence of Standard Asphalt Road Oil treated streets.

You Can Have Streets *Like This*-

THE initial cost is surprisingly low, the upkeep is less and the condition of the street improves steadily, year after year. There is no reason why the streets in every village should not be thus improved—the cost is within the reach of all and no village, town or city could make a better investment.

At Melvin, Illinois, the oiling is being done so that the best results are being obtained. The treatment of the streets in the early summer eliminates the dust nuisance, while the application of a second coat in the early fall puts the streets in excellent condition to go through the winter.

The No. 5 Standard Asphalt Road Oil which the town of Melvin uses has an asphalt content of not less than 50%. Because it is rich in asphalt, it actually builds up an enduring wearing surface which becomes heavier and smoother with each application.

To take care of different local conditions Standard Asphalt Road Oils are made in four grades and our engineers are available at all times to confer with city, county or state engineers, supervisors and road commissioners on their work and advise them as to the particular grade which will give the best results.

This service has resulted in saving large sums of money and building up better streets for many villages, towns, cities and counties throughout the middle west. The service is free and we urge road builders everywhere to avail themselves of it.

As the great demand for our road oils during the summer quickly depletes our stock, we would point out the importance of placing orders early. Be safe—use the phone or wire now.

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(INDIANA)

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Joliet	South Bend	Mason City	Detroit	WISCONSIN	Minneapolis	St. Louis
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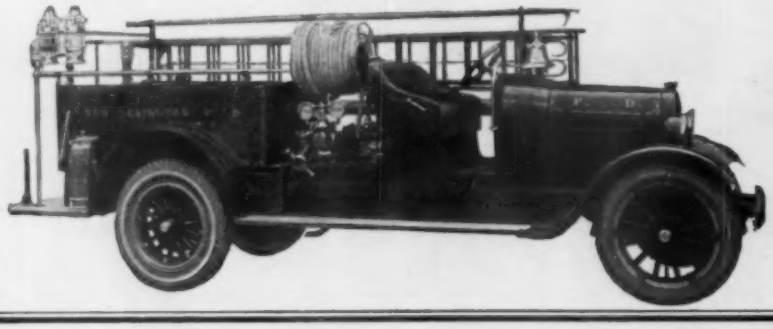

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"Up with another ladder!"

Up go the ladders, then the hose lines, as close as the heat permits your men to carry them. It's a man's job, operating the hose from a slippery footing on the ladder rungs, far above the pavement.

If hose or man weakens under pressure, the cost cannot be foretold. Fire hose that bears the brand "Eureka" will not fail you in an emergency. Eureka Fire Hose brands such as "Paragon" have been delivering dependable service on the fire lines of the country for over fifty years.

Eureka Fire Hose Manufacturing Co.

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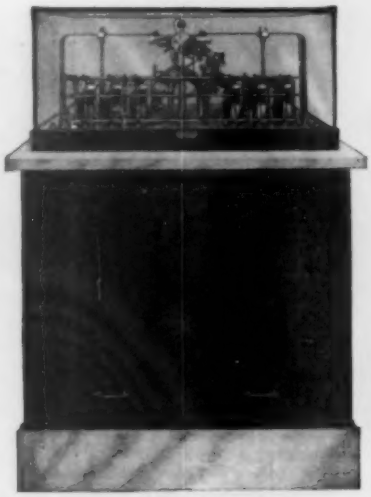
Hints on Maintenance Repeaters



The dependability of Gamewell Repeaters has been demonstrated by the large number that have been in continuous service from twenty to thirty-five years. Such service has been made possible through the high type of material and workmanship embodied in the repeater together with the "hands off" policy of most central office operators.

The merits of such a policy can be easily seen when it is explained that there are twenty-two adjustments in a repeater, and a slight change in any of these will affect one or more of the other adjustments and cause the repeater to operate incorrectly.

Care should be taken to prevent dust from entering the mechanism. Blow off any that might accumulate with a bellows. There is very little danger from dust with the present type of dust-proof case.

The repeater should be oiled once a year with a high grade watch oil applied with a small wooden stick, a drop to each pivot. Any old or surplus oil that has worked out of the plates should be carefully wiped off with a piece of cheesecloth.

Further information on the care of signal apparatus can be obtained by writing for a copy of our book, "The Care and Maintenance of Fire and Police Signal Systems."

THE GAMEWELL COMPANY

Newton Upper Falls, Mass.

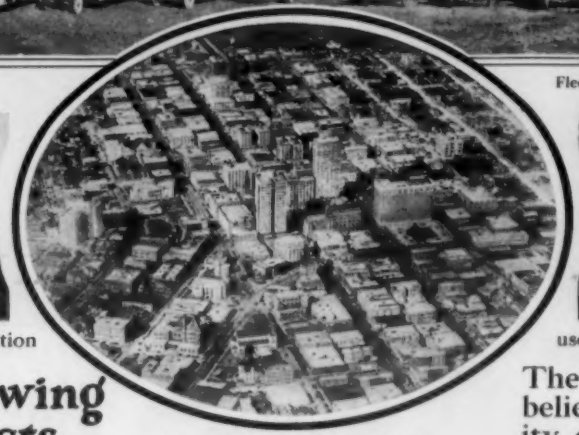
A BOX A BLOCK

The Gamewell Register

After fourteen (14) years' service with the City of Alameda, Calif., a 3 circuit automatic Gamewell Repeater was sold to a leading steel company in 1904 where it has been in service for twenty-one (21) consecutive years without repair, making a service record of thirty-five (35) continuous years.

Fleet of American-LaFrance Fire Apparatus at Fort Worth, Texas

New Bungalow type of fire station



Downtown section of Fort Worth

used by Fort Worth Fire Department

Progressive, Fast Growing FORT WORTH *selects*

AMERICAN-LA FRANCE

Fire Apparatus

The rapid development of the nation's great southwest in very recent years has caused the phenomenal growth of many cities.

Fort Worth, being full of progressive people, has taken advantage of its opportunities. Its cordial welcome to visitors, either commercial or pleasure bent, causes the city to be long remembered by all visitors.

The progressive citizens of Fort Worth, believing in the sturdiness and reliability of American-La France Fire Apparatus, have purchased 24 pieces of American-La France to stand guard against the ever present danger of fire.

Daily, more and more practical cities are deciding that American-La France is the best solution to their fire problem.

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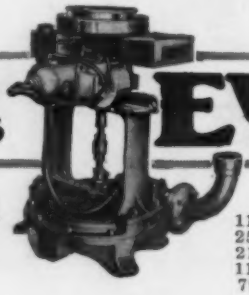

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DEALERS: *Write or wire us for proposition.*

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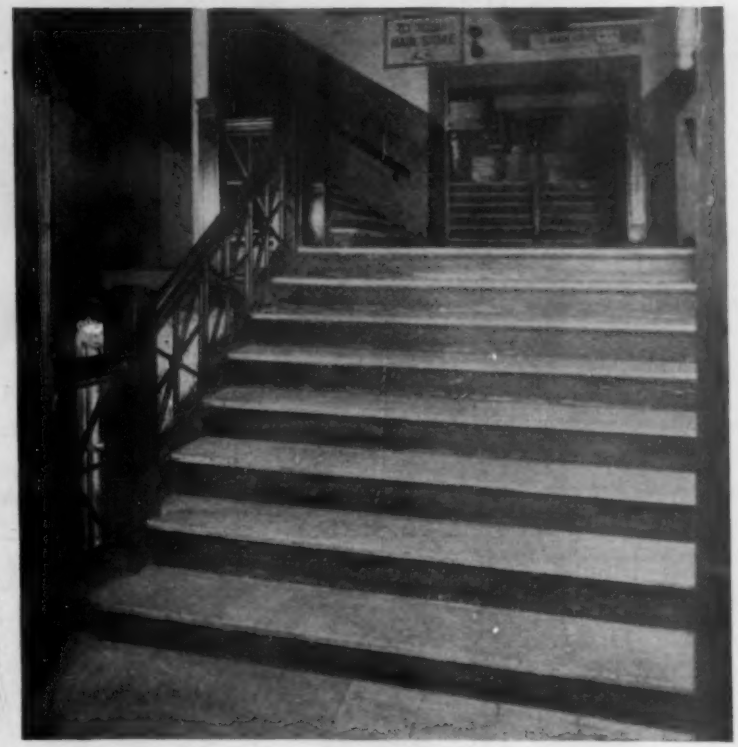
Alundum Tiles, Treads and Aggregates



All types of Norton Floors are made permanently slip-proof, durable and quiet by the bonded electric furnace abrasive, trademarked "Alundum"—long used in the well-known Norton Grinding Wheels.

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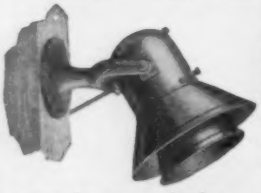

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